TECHNOLOGY DEPT.

ROADS AND STREETS

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OCTOBER, 1945

Near you there is a Service Shop for TIMKEN ROCK BITS

One of the important reasons for the widespread use of Timken Rock Bits in the mining, quarrying and construction industries is the availability of prompt and economical service for converting hollow drill steels for use with Timken Rock Bits.

Located at 80 strategic centers throughout the country are modern well-equipped independently operated service shops, such as the one illustrated here. Most of these shops are also able to recondition used Timken Rock Bits for additional drilling — thus decreasing your drilling costs.

If your operations do not justify the maintenance of your own shop you may still enjoy the advantages of Timken Rock Bits by utilizing the services of the shop operator in your immediate locality. Write us for his name and address.

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
ROCK BITS

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

STARTING IS NO PROBLEM... WITH ADAMS

● Whatever the weather—whether you are working in the frozen North or the torrid Tropics—your Adams Motor Grader starts quickly, easily—merely by pushing a button in the cab.

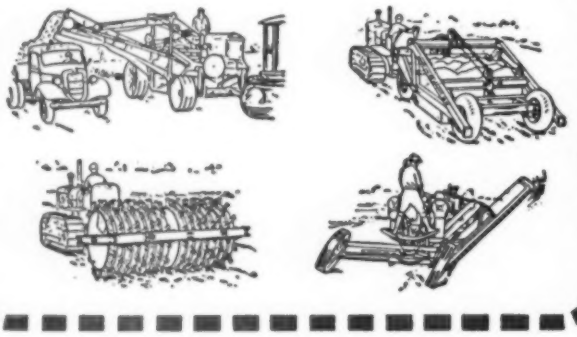
That's because low-compression gasoline starting equipment is an integral (not auxiliary) part of Adams' International Diesel engines. A minute or two of warm-up on gasoline, then the pull of a lever throws the engine into full Diesel power. So, for all practical purposes, the starting of an Adams Motor Grader is as simple and certain as that of an automobile.

Adams' International Diesel engines are famous, too, for rugged, long-life dependability. All over the world, under all kinds of conditions, they have hung up performance records that are second to none. And they're as economical as they are reliable—most Adams heavy-duty graders operate on two gallons or less of low-priced Diesel fuel per hour—even in hard going.

Let the Adams dealer near you show you the many outstanding features that make Adams Motor Graders your best buy—on every count!

J. D. ADAMS MANUFACTURING CO.
INDIANAPOLIS, INDIANA

ASK YOUR DEALER ABOUT THESE MACHINES



Adams

ROAD-BUILDING AND EARTH-MOVING EQUIPMENT

Yes—highway construction ahead. Plenty of it. And a lot of it, planned by far-seeing highway engineers, is going to make good use of Bethlehem's complete line of steel highway products.

By buying from Bethlehem, you get service that's co-ordinated to save confusion, delay and extra paper-work. Your order is handled as a unit, with shipments scheduled to reach the job as needed. No delays! No idle men—no idle equipment!

Bethlehem makes all the steel products needed in building a modern concrete highway or highway bridge. The nearest Bethlehem district office will gladly give you full information, and explain in detail how Bethlehem's complete highway service can save you time and money. Write or phone today!

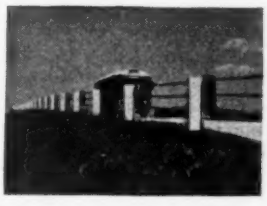
Bethlehem Steel Company, General Offices: Bethlehem, Pa.

REINFORCING STEEL

Bethlehem Reinforcing Bars, plain and deformed, are made in all standard sizes and grades, of new-billet steel. Most Bethlehem warehouses can bend bars to shape and cut them to specified lengths.

Bethlehem Welded Wire Fabric is made from tough, cold-drawn wire, is readily installed and gives reliable service. Made in types to meet all standard specifications.

GUARDS AND POSTS



Standard Bethlehem ¾-in., 3-strand highway guard is made of tough, durable, double-galvanized Bethlehem steel cable, good for years of service. Bethlehem's beam-type guard rail, called the Safety-Beam, is made in standard lengths of 12 ft., 6 in.—or can be supplied in lengths up to 50 ft. The Bethlehem standard guard rail post is approved in many States where guard rail is an important part of the highway program.

BETHLEHEM PRODUCTS FOR HIGHWAYS . . . . Road Joints . . . . Center Strip . . . . Dowels . . . . Dowel Bar Supports . . . . Reinforcing Bars . . . . Bar Mats . . . . Bar Ties . . . . Reinforcing for Concrete Pipe . . . . Bridge Floor Reinforcing . . . . Concrete Slab Spacers . . . . Welded Wire Fabric . . . . Guard Rails . . . . Guard Posts and Brackets . . . . Wire Rope and Strand . . . . Right-of-Way Fence and Posts . . . . Anchor Rods . . . . Pipe . . . . Hollow Drill Steel . . . . Digging Bars . . . . Structural Steel . . . . Mold Boards . . . . Corrugated Sheets . . . . Turnbuckles . . . . Tie Rods, Spikes, Bolts and Nuts . . . . Timber Bridge Hardware . . . . Sheet and H-Bearing Piling

Now... THE GREAT

HERE they are—four great new Lorains we've been waiting to tell you about! This brilliant, hard-hitting "41" series of machines combines 50 years of shovel and crane engineering experience with the valuable new things we've learned building for war. They're heavier, new in performance, greater in capacity, easier to service, crammed with profit-making new features. They're the best we've ever announced—and best of all, they're HERE—ready and raring to go into your postwar business!

Every one of these four new performers—the Lorain 41 Crawler, the Moto-Crane 414, the Moto-Crane 416, and the Self-Propelled Crane 414—has its own long list of great features. Any one of these machines is good news by itself. But Thew now gives you all of them at once—so you may have the one that's best in mounting, boom equipment, speed and basic efficiency for your job.

Features, Features and More Features!

Thew engineers spared no effort—left no spot untouched—in drawing the plans for these new beauties. Here are just a few things they did for you!

A brand new, long life, shoe type swing clutch that gives far smoother action and many times the usual service life. Greatly increased capacities (ask for the new ratings.) ¾-yd. chain crowd shovel. Dual boom stop on all crane booms . . . a double safety feature. Two-piece, all-welded, pin-connected, fast-assembly boom interchangeable for all crane, clam and drag work. All available with gas, diesel or electric power.

As soon as you see these new Lorains in action, you'll want to put one to work! Check the features and capacities we have room to give you here—then see your nearest Lorain Distributor for the complete facts!

GET THE FACTS AND YOU'LL GET A...

SEE YOUR LORAIN DISTRIBUTOR NOW!

NEW LORAIN "41" SERIES!

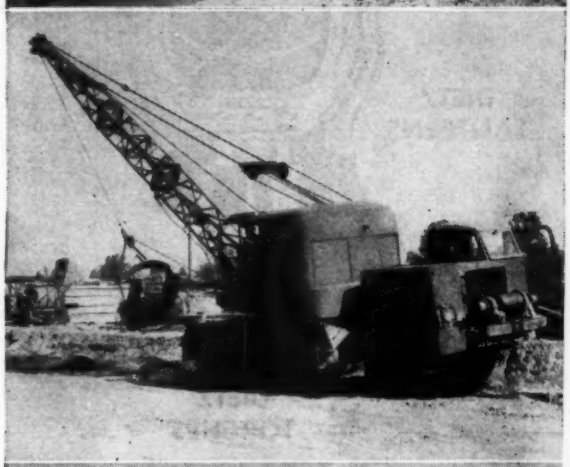
LORAIN 41, 2-SPEED, CHAIN DRIVE CRAWLER

Entire mounting is new, longer, wider, heavier.
30" swamp type treads standard.
Two travel speeds standard — ¾ and 1⅞ MPH — either direction.
Steers from cab in any swing position.
New, positive 4-way ratchet and pawl tread and travel lock.
Greater crane capacities.
Greater clamshell and dragline bucket capacities.
Convertible to shovel, crane, dragline, clamshell, backdigger.

The Three New Rubber-Tired Lorains

MOTO-CRANE 414 (4-WHEEL DRIVE)

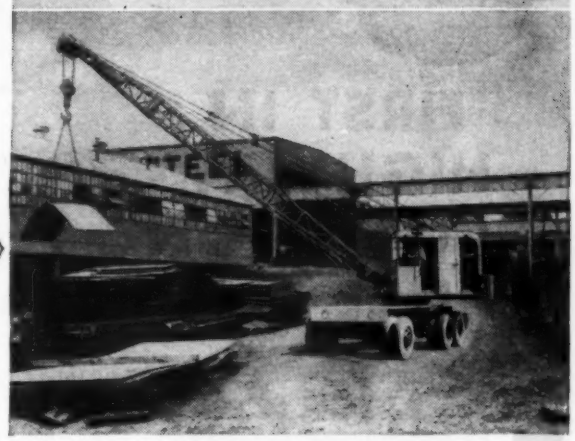
Greater crane capacity—now 20 tons.
Carrier specially designed for shovel and crane loads.
Ten forward speeds, 1 to 28 MPH. Two reverse speeds.
Six wheels. Four dual-tire rear wheels powered by two worm driven axles.
Air brakes on four rear wheels.
Convertible to shovel, crane, dragline, clamshell, backdigger.



MOTO-CRANE 416 (6-WHEEL DRIVE)

Here, for the first time commercially—the heavy-duty rubber-tired Moto-Crane that was developed for Military Service and came out with top honors for stamina and performance!

20-ton crane capacity.
Six-wheel drive. All axles double-reduction drive.
Eight speeds forward, 1 to 31 MPH. Two reverse speeds.
Power-assisted steering.
Air brakes on all six wheels.



SELF-PROPELLED CRANE 414

20-ton crane capacity.
Single engine, single operator.
Six wheels with power on four worm driven rear wheels.
Four travel speeds in both directions, 1 to 7 MPH.
Simultaneous hoist, swing, travel and boom derricking.
Air brakes on four rear wheels.
Air power, finger-tip steering.
Dual-tired front wheels, differential type to eliminate scuffing.

THE THEW SHOVEL COMPANY • Lorain, Ohio

Reg. Trade Mark

thew-Lorain

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

DIETZ LANTERNS

DIETZ TORCHES

FIRST IN HIGHWAY PROTECTION SINCE 1840

DIETZ LANTERNS

1840 R. E. DIETZ COMPANY NEW YORK 1945

Output Distributed Through the Jobbing Trade Exclusively

ROADS AND STREETS

Vol. 88, No. 10 October, 1945

ECA

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING

HALBERT P. GILLETTE, President; EDWARD S. GILLETTE, Publisher; HAROLD J. McKEEVER, Editor; CHARLES T. MURRAY, Managing Editor; JOHN C. BLACK, Field Editor; LT. COL. V. J. BROWN, Publishing Director (Absent on Military Duty); H. J. CONWAY, Advertising Editor; L. R. VICKERS, Promotional Director.

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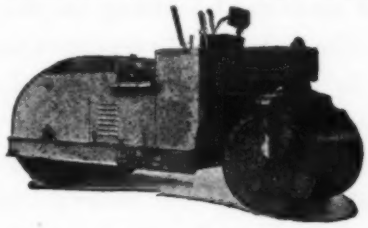
FOR AIRPORT CONSTRUCTION AND MAINTENANCE

An important role has been played by Galion Road Machinery in this war, helping to build and maintain strategic roads and airfields on many of the fighting fronts all over the world.

Galion graders and rollers will be available for that airport construction contemplated for tomorrow. Big motor graders for the primary construction and earth moving . . rollers for precise compaction in apron, taxiway and runway construction and maintenance. Get our latest catalogs.

Galion motor graders are big and strong——able to stand up in day-after-day service on the toughest kind of job. Tandem drive, hydraulic control and a wide range of blade adjustment make them a valuable tool in preparing the ground in road and airport construction.

Galion portable roller—a small versatile unit, light in weight, for general patch work around the airport. Every airport should have one of these machines—they come in handy.



Galian tandem roller—variable in weight from 5 to 14 tons. Gasoline or diesel power—hydraulic steering. Also three-wheel and trench rollers for low-cost compaction on many different jobs.

WINGS OVERHEAD NOW
Forecast a Shadow of Things to Come

THE GALION IRON WORKS & MFG. CO.

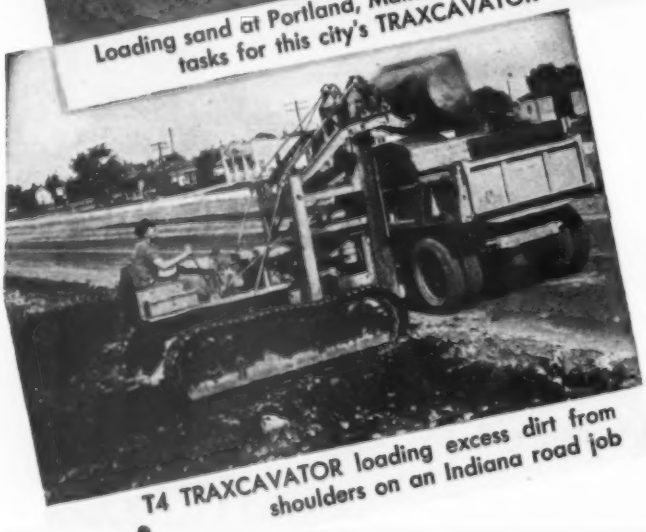
MAIN OFFICE AND WORKS: GALION, OHIO

Distributors in Most Large Cities

PLAN FOR BETTER EQUIPMENT, TOO!

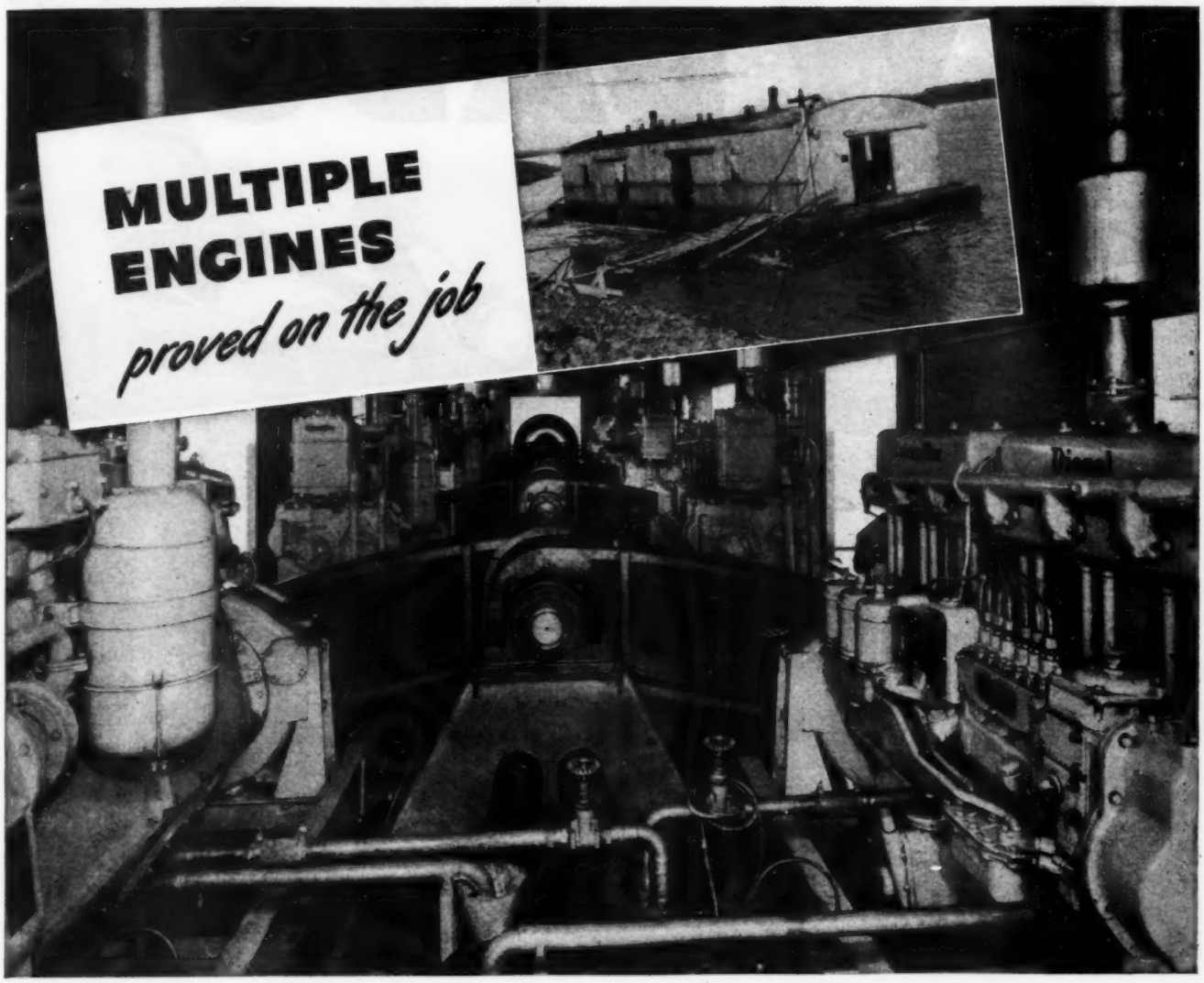
Big 2½ yard T7 TRAXCAVATOR grading new street in San Francisco

Loading sand at Portland, Maine . . . one of many tasks for this city's TRAXCAVATOR



T4 TRAXCAVATOR loading excess dirt from shoulders on an Indiana road job

WHEN the "go-ahead" signal is given, your well-planned construction projects will get off to a flying start if you have planned to "TRAXCAVATE" — for it's the modern earth-moving and material-handling method. TRAXCAVATORS, the dependable tractor excavators, combine in one machine the usefulness of a shovel, loader, scraper, bulldozer, anglegrader, etc. There's a size for every job and purpose. Your TRACKSON-"Caterpillar" dealer will be glad to give you the complete and revealing story, or write to the TRACKSON COMPANY, Dept. RS-105, Milwaukee 1, Wisconsin.



DIESEL POWER for variable loads, through multiple-engine hook-up, is nothing new with "Caterpillar." Fourteen years show hundreds of such "Caterpillar" Diesel installations, in all types of industries, where their advantages are being proved daily.

In the installation pictured here, TEN "Caterpillar" Diesel D13000 Engines are all belted to a single shaft to drive a 700 KVA generator supplying power for a 600-hp. motor generator in a tower machine used in levee building. Any eight of the engines can carry the full load—thus affording a high ratio of standby power. Partial loads are easily handled by cutting out any engines not needed. This "floating power house" can also supply emergency power to flood-stricken communities.

Economical power in multiple "packages" which in any combination or grouping can readily be matched to varying loads—that's what leads to greater production, steadier going, lower costs, better profits when "Caterpillar" Diesels are put on the job.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

• SIX SIZES—34 to 190 hp.—applicable to multiple hook-ups of 2 to 20 units—*in many combinations of sizes.*

CATERPILLAR REG. U.S. PAT. OFF. **DIESEL ENGINES**

TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

The discharged veteran wears this emblem. Remember his service and honor him.

A.W. BADGER

With the Badger, only the bucket, boom, turntable and mast swing. The heavy main deck, engine, transmission and main frame are STATIONARY—to counterbalance heavier loads and avoid objectionable tail-swing.

The Badger makes more swings per minute, day, month and year . . . wastes no fuel or power swinging extra weight . . . digs the hardest "diggable" material . . . can work in closer quarters.

Profits are made by working fast and saving time. Clipping a few seconds off each dig-swing-dump cycle means more yardage at the close of the day.

Released from its duties with the Armed Forces, the Badger is once again available for prompt delivery. Your nearby A-W Distributor will be glad to tell you the whole story.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.

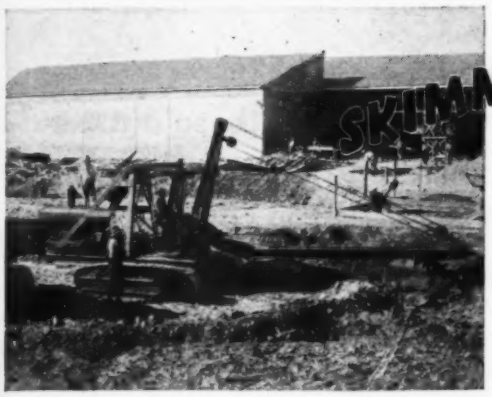
SHOVEL

CONVERTIBLE TO..

ILLINOIS—
"Hewing to the line" and leaving a firm, clean, vertical bank.

CRANE

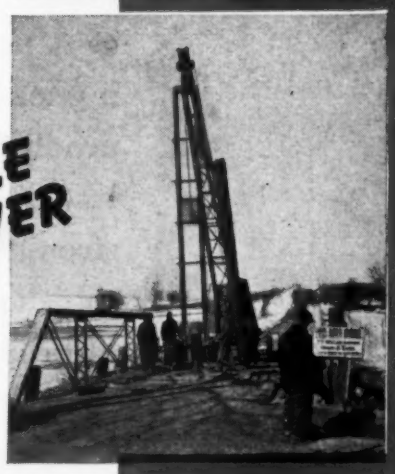
INDIANA—
Erecting tanks for oil-refining use. Steel sheets weigh about 3 tons.



SO. AFRICA—
Levelling ground for workshop and garage extensions.

PILE DRIVER

IOWA—
Driving 34-foot piling for a new and larger bridge with an 1800-lb. hammer.



CLAM SHELL

WYOMING—
Digging pits and placing dirt around concrete forms for a new overpass at the rate of 300 yds., in 8 hours time.

DRAG LINE

MONTANA—
Cleaning, deepening and widening a creek that serves as a run-off for several mine smelters.

BUILDERS OF ROAD MACHINERY

ARMY E NAVY

Austin-Western

SINCE 1859

BUY MORE WAR BONDS

WIRE ROPE S
NOW
FOR KNOWN S

● A new wire rope sling service that offers these outstanding features: *1.* Every **ACCO** "Registered" Wire Rope Sling is proof tested to twice the rated capacity. *2.* Certificate of test and registry showing actual proof test load and rated strength is furnished. *3.* Each sling identified with metal registry tag. *4.* Made only from Preformed Wire Rope of Improved Plow Steel Grade.

ACCO "Registered" Service helps you select the right wire rope sling for your particular job—then registers and identifies it for known strength.

ACC

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Bridgeport, Conn.

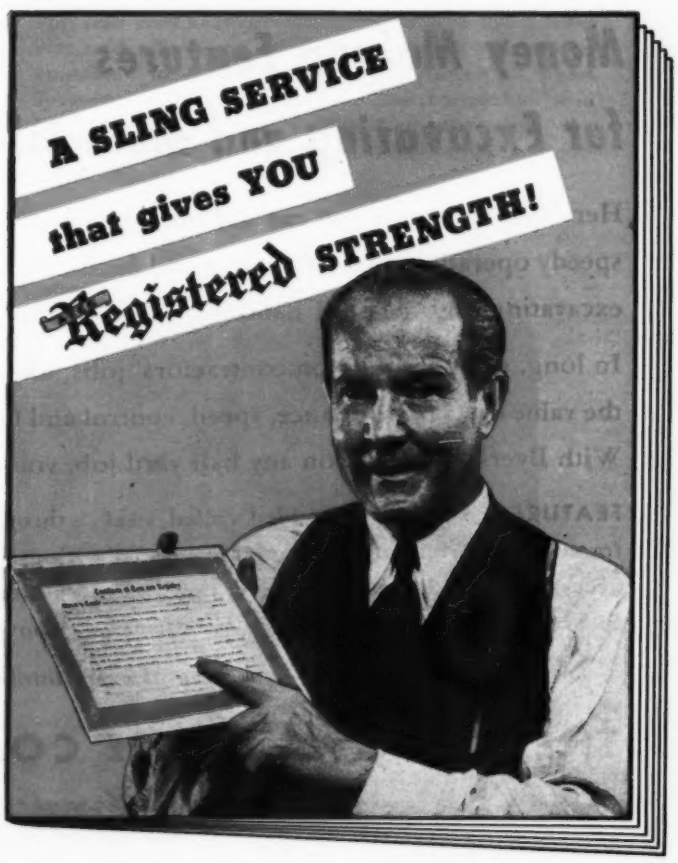
HAZARD WIRE ROPE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

SLINGS

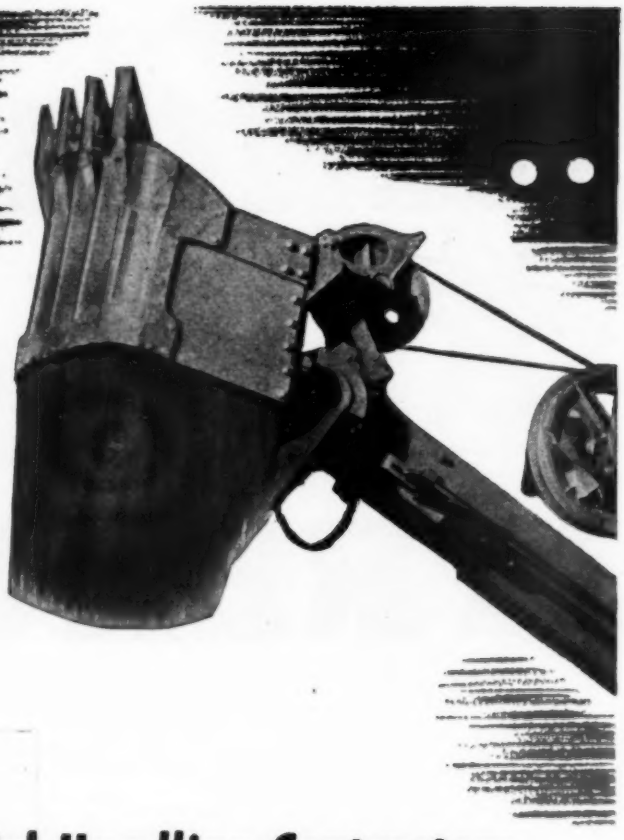
ACCO Registered STRENGTH



Send for this Bulletin which gives you 7 reasons why ACCO "Registered" Wire Rope Slings give you known strength

★ ★ ★ ★ ★

TESTED...



BYERS MODEL 61

1/2 YD. POWER SHOVEL

...With New Improved Money Making Features for Excavating and Material Handling Contractors

Here's an excavator you can depend on to give you new high powered performance, speedy operation, ease of control and flexibility . . . in fact, it was designed for *today's* excavating and material handling requirements.

In long, gruelling *tests* on contractors' jobs, under contractors' supervision, it *proved* the value of its performance, speed, control and flexibility. It has contractors' *approval.* With Byers Model 61 on any half yard job, you can compete.

FEATURES: Sturdy unit welded rolled steel frames. Powerful 60 H. P. motor with all accessories. Gears enclosed and operating in circulating oil bath. Anti-friction bearings throughout. Airflex self-aligning, non-adjusting, long-lived clutches. Air brakes. New easy finger tip control. Independent operations. Convertible to all attachments.

For complete information see your nearest Byers distributor or write for new illustrated catalog.

THE BYERS MACHINE CO., RAVENNA, OHIO

Distributors throughout the world

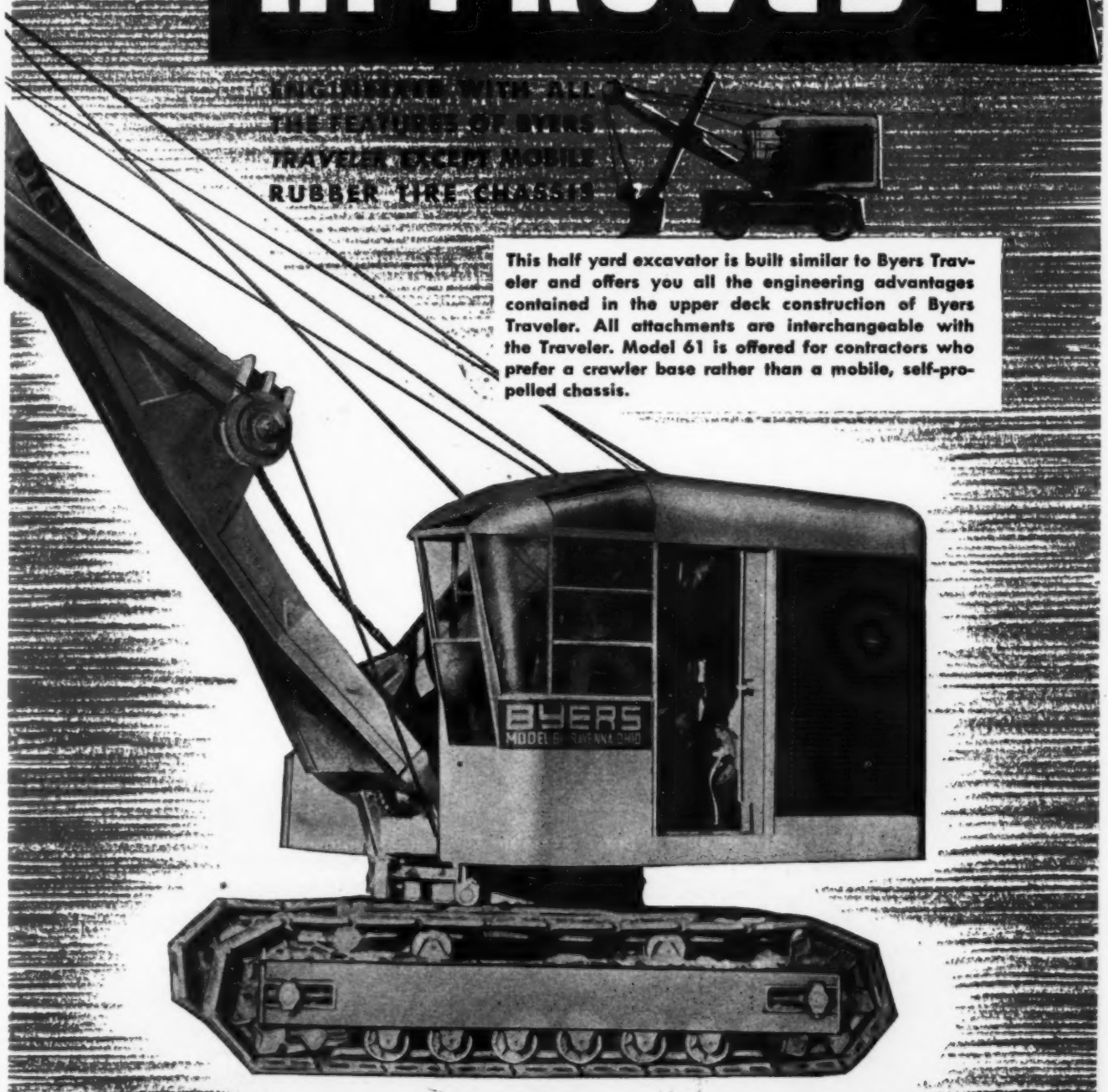
BYERS

Proved...

APPROVED !

EQUIPPED WITH ALL THE FEATURES OF BYERS TRAVELER EXCEPT MOBILE RUBBER TIRE CHASSIS

This half yard excavator is built similar to Byers Traveler and offers you all the engineering advantages contained in the upper deck construction of Byers Traveler. All attachments are interchangeable with the Traveler. Model 61 is offered for contractors who prefer a crawler base rather than a mobile, self-propelled chassis.



1/2 YD. MODEL 61

Work horse

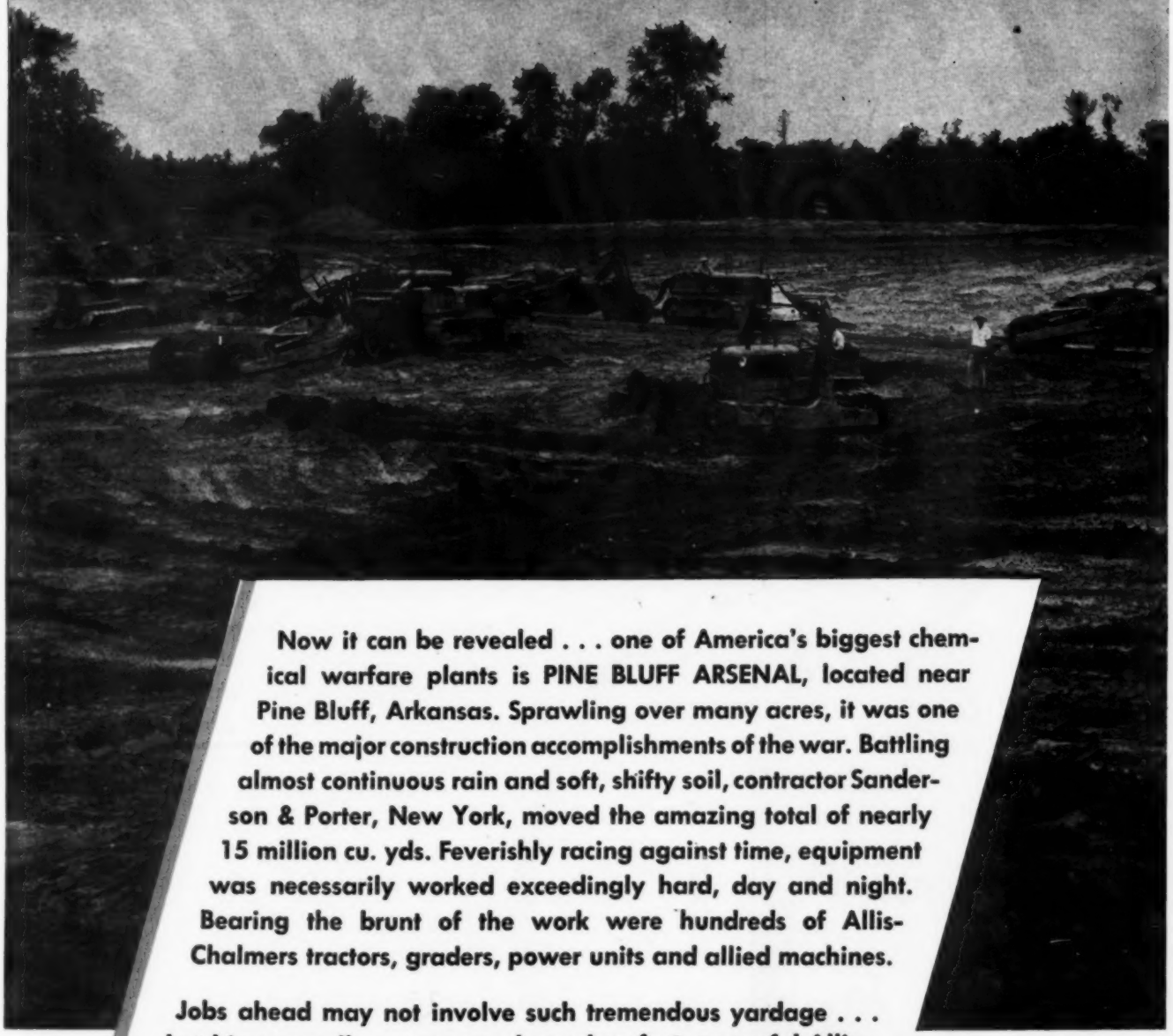
Armed with a Barco Portable Gasoline Hammer, a man is ready for any breaking, drilling, driving and tamping job. Under the toughest conditions... in hard-to-reach spots, Barco has a tried and true high performance record. Eleven special attachments make Barco useful and economical on a wide range of heavy work. *Investigate*

BARCO Portable Gasoline Hammers

FREE ENTERPRISE—THE CORNER-STONE OF AMERICAN PROSPERITY

BARCO MANUFACTURING COMPANY, NOT INC., 1815 Winnemac Ave., Chicago 40, Ill. • In Canada: The Holden Co., Ltd., Montreal, Can.

15 Million Yd. Job!



Now it can be revealed . . . one of America's biggest chemical warfare plants is PINE BLUFF ARSENAL, located near Pine Bluff, Arkansas. Sprawling over many acres, it was one of the major construction accomplishments of the war. Battling almost continuous rain and soft, shifty soil, contractor Sanderson & Porter, New York, moved the amazing total of nearly 15 million cu. yds. Feverishly racing against time, equipment was necessarily worked exceedingly hard, day and night. Bearing the brunt of the work were hundreds of Allis-Chalmers tractors, graders, power units and allied machines.

Jobs ahead may not involve such tremendous yardage . . . but big or small . . . you can depend on fast, powerful Allis-Chalmers Diesels to rush them to completion in less time, at greater profit to you. Improved by their experience on many tough war projects and campaigns, the new A-C tractors are ready to establish new records on peacetime operations. For early delivery . . . order NOW!

Part of the big fleet of A-C Diesels on the Pine Bluff Arsenal project. Nearly a hundred miles of roads and forty-five miles of railroads were built on the site of this plant.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

I KEEP 'EM ROLLING

● It's only while your equipment keeps rolling that you make money. And that requires proper lubrication—requires "Minit" Maintenance. It's the new "on the spot around the clock" lubrication service that keeps your machines working at fullest production.

The "Minit" Lubricator establishes positive protection against "lack of lubrication" breakdowns for each and every piece of machinery on all your jobs.

The "Minit" Lubricator is designed and built to provide "on the spot—around the clock" lubrication service. It is the only lubricator that paddles and packs as it pumps (Padl Pak) . . . an entirely new feature in lubrication. It empties the container without a sputter. Eliminates air pockets in the grease. Pumps grease on the first stroke in all kinds of weather. The "Saddle Grip" handle assures easy lifting and carrying. "Duck Foot" base provides firm foundation on any ground. Gear Drive gives higher pressure and smooth, easy pumping. Specially designed housing insures against cut hands, bruised or pinched fingers. 30 lb. capacity takes full 25 lb. can of lubricant—services hundreds of fittings at one fill. Rugged—stands terrific punishment. Write today for complete details.

"IT PADDLES AND PACKS AS IT PUMPS"

"MINIT" MAINTENANCE!

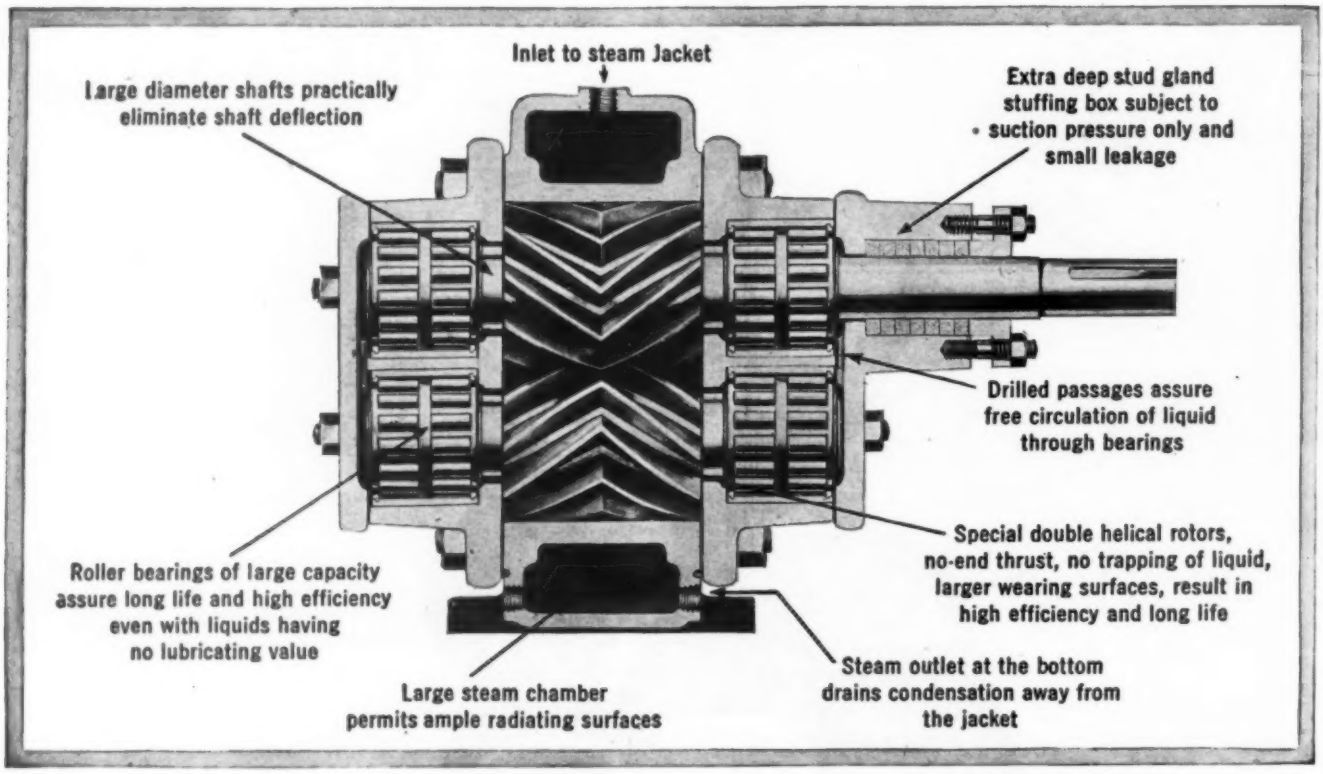
1. Keeps your machines working at fullest production.
2. Protects your machinery investment at lowest possible cost.
3. Makes possible the division of your lubrication problem into individual operations with individual responsibility.
4. Means money in pocket for you.

BALCRANK

BALCRANK INC., CINCINNATI 9, OHIO

LUBRICATION LEADERSHIP SINCE 1906

HOW TO HANDLE ASPHALT WITHOUT GETTING "STUCK"


Inlet to steam Jacket
Large diameter shafts practically eliminate shaft deflection
Extra deep stud gland stuffing box subject to suction pressure only and small leakage
Drilled passages assure free circulation of liquid through bearings
Special double helical rotors, no-end thrust, no trapping of liquid, larger wearing surfaces, result in high efficiency and long life
Roller bearings of large capacity assure long life and high efficiency even with liquids having no lubricating value
Steam outlet at the bottom drains condensation away from the jacket
Large steam chamber permits ample radiating surfaces

Specify Worthington GRJ Steam-Jacketed Rotary Pumps

Trouble-free handling is what you want in the pump you depend on for putting asphalt where you want it when you want it.

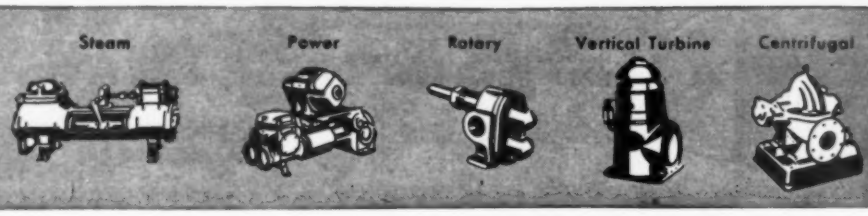
Fortunately, you can get dependability in a Worthington GRJ Steam-Jacketed Rotary Pump. The cross-sectional picture above shows you why. One thing the picture doesn't show, however, is the short starting time which results from the large radiating surfaces of the Worthington heating jacket. That means less time lost by equipment and men waiting for asphalt to flow.

Your nearby Worthington Representative can give you other valuable facts about Worthington GRJ Rotary Pumps. In the meanwhile, you can prove that *there's more worth in Worthington* by writing for Bulletin W487-B11. *Worthington Pump and Machinery Corporation, Harrison, New Jersey.*

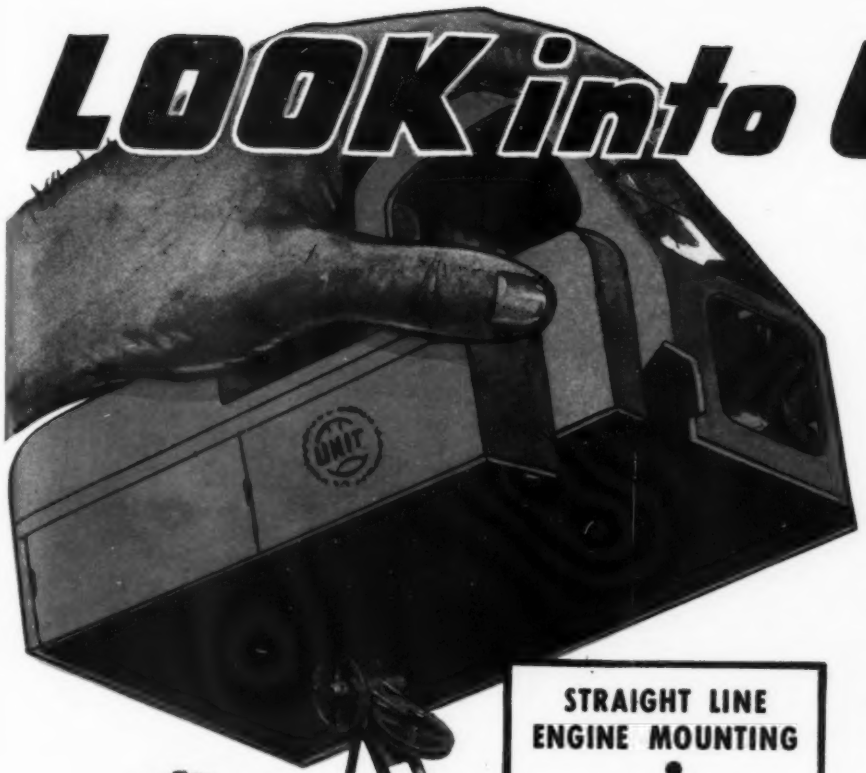
WORTHINGTON

PS.11

THE WORLD'S LARGEST MANUFACTURER OF PUMPS



LOOK into UNIT!



Lift the cab from any UNIT crane or shovel. You'll find the following exclusive features not found in any other comparable machine:

- **Compact, modern design . . . all parts readily accessible.**
- **Gasoline engine mounted in straight line with main machinery.**
- **Drop-forged alloy steel gears and splined shafts, heat-treated.**
- **Automatic traction brakes . . . no manual control required.**
- **Disc type clutches, interchangeable with easy and foolproof adjustment.**
- **One-piece cast gear case...simple in design and built as carefully as the finest automotive transmission . . . dust-proof and oil tight.**

And that isn't all! A UNIT costs less . . . is more economical to operate . . . is built to endure. Investigate today.

STRAIGHT LINE ENGINE MOUNTING

●

ONE-PIECE CAST GEAR CASE

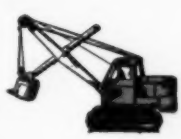
Convertible TO ALL ATTACHMENTS

Shovel . . . Clamshell . . . Dragline . . . Trenchoe . . . Magnet . . . Pile Driver . . . Back Filler.

UNIT 1020
Clamshell

UNIT 357
Mobile Crane

UNIT 514
Trenchoe



UNIT 514
Shovel

FULL VISION CAB

Operator can see in ALL directions. No "blind spots". Promotes safety. Increases job efficiency.

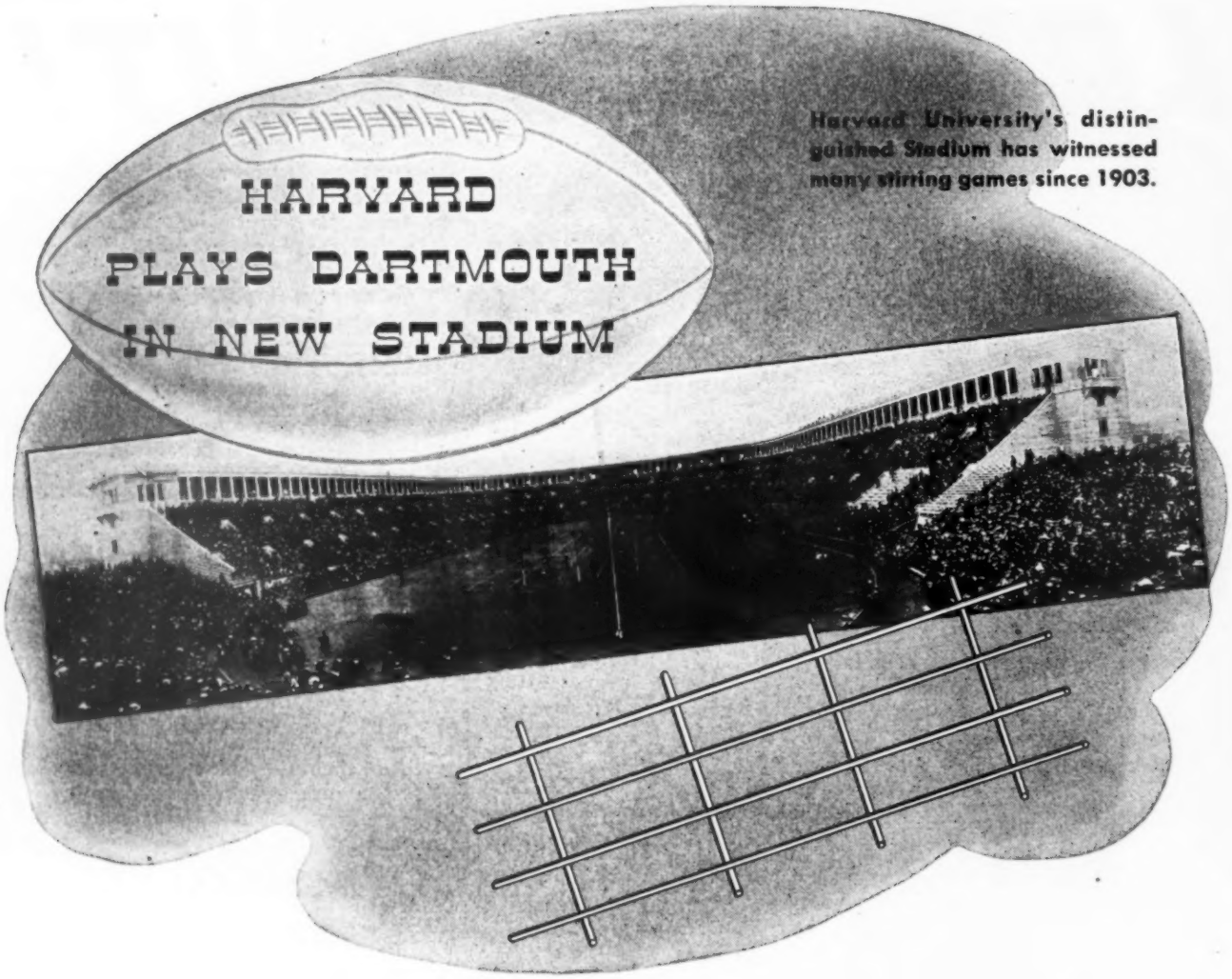
½ AND ¾ YD. EXCAVATORS

5 TO 10 TON CRANES

UNIT CRANE & SHOVEL CORP.

MILWAUKEE 14, WISCONSIN, U.S.A.

A4868-IP-C



Harvard University's distinguished Stadium has witnessed many stirring games since 1903.

That was the news on Nov. 10, 1903 when Harvard University dedicated its new Stadium which, while not the largest in America, is considered by many to be one of the most beautiful.

"From an engineering standpoint," states the Harvard University Handbook, "the Stadium is notable as being one of the first instances of large scale use of reinforced concrete." Clinton Electrically Welded Fabric had been invented just the year before, and 150,000 feet of this strong, uniform fabric was used in reinforcing the Stadium.

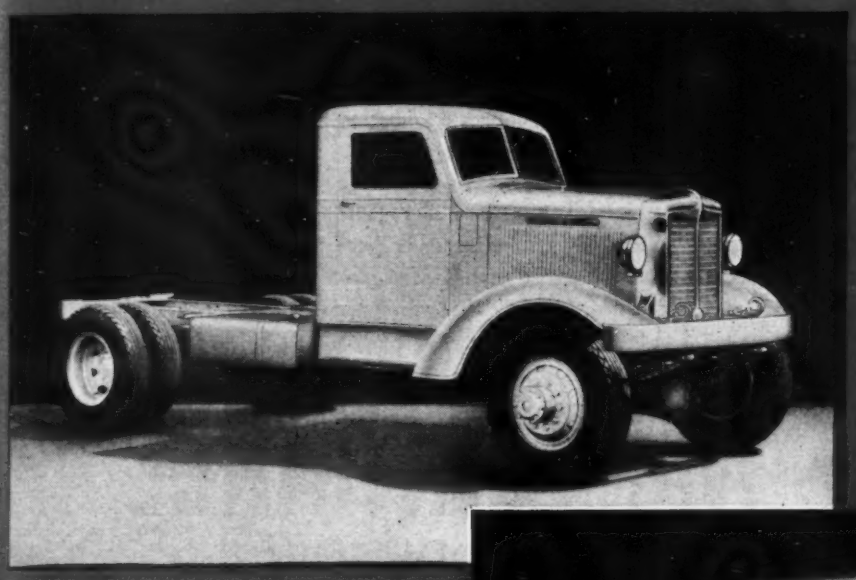
The perfect wire welds and high tensile strength of Clinton Welded Fabric, and its advantages of easy handling and installation were quickly recognized by contractors and engineers. It was used in the Syracuse University Stadium built in 1907, in Princeton's Palmer Stadium erected in 1914, and in many thousands of concrete structures of all types which are still serving with a minimum of maintenance.

Our increased production facilities are now available for peacetime construction. If you need Welded Fabric for reinforcement of concrete buildings, bridges, sewers or streets, write Structural Products Division, Wickwire Spencer Steel Company, 14 Lafayette Square, Buffalo 3, N. Y., or our nearest branch office.

WICKWIRE SPENCER STEEL COMPANY

500 FIFTH AVENUE, NEW YORK (18), N. Y.

ABILENE (TEX.) • BOSTON • BUFFALO • CHATTANOOGA • CHICAGO • CLINTON (MASS.) • DETROIT • HOUSTON • LOS ANGELES • PHILADELPHIA • SAN FRANCISCO • TULSA • WORCESTER



New, streamlined, improved models of Marmon-Herrington Heavy Duty *All-Wheel-Drives* with gross capacities up to 27,000 lbs., have up to 161" wheelbase, 131 h.p. in four-wheel-drive models. Also available in six-wheel-drive models. Easier, more positive steering, Westinghouse air brakes. New, roomier, more comfortable cabs.

As in the past, Marmon-Herrington converts all standard Fords to *All-Wheel-Drive*. Either four-wheel-drive or six-wheel-drive available in larger models. Gross load capacities up to 22,500 lbs. These are the lowest priced *All-Wheel-Drives* on the market.

ONLY MARMON-HERRINGTON CAN OFFER SO MUCH!

Users of multiple wheel drive trucks, in the highway, construction, oil, public utility, logging, mining and similar industries will find a vehicle in the postwar Marmon-Herrington line to meet every requirement of size, power and price. Marmon-Herrington *All-Wheel-Drive* converted Fords, and Marmon-Herrington Heavy Duty *All-Wheel-Drives* in four wheel drive, and six wheel drive models, offer the utmost in operating ability across country or on and off the highway. Popular long before the war, seasoned by military operation, improved models are now ready for the hardest peace-time transportation jobs.

Marmon-Herrington *All-Wheel-Drives* are not "ordinary" trucks, in any sense of the word. Having power and traction applied through all four, or all six wheels, they do things other trucks cannot do, go places other trucks cannot go. If the job calls for ability to haul heavy loads *across country,* or to operate *off the highway,* as well as on paved roads, you need a Marmon-Herrington *All-Wheel-Drive.* If you need trucks that will keep going, through deep mud, sand or snow, or trucks that will climb unusually steep grades—*these* are the trucks for the job. Write for literature.

MARMON-HERRINGTON CO., INC.
INDIANAPOLIS 7, INDIANA

MARMON-HERRINGTON *All-Wheel-Drive* **TRUCKS**

The new Ward LaFrance civilian trucks now beginning to roll off our assembly lines offer you **plus values** in power, rugged construction, dependability and low hauling costs. You have never seen anything to match them.

THE TOUGHEST, MOST ECONOMICAL BIG TRUCKS MONEY CAN BUY...

Don't take our word . . . . . take a demonstration.

We know this because they are the civilian version of our military models which have been called on to do the toughest jobs any trucks ever were asked to perform, and proved themselves over millions of miles, in combat, all over the world.

Here's a truck that is new, better, **proved.** Forget the limitations you've become used to in the past. Think in terms of what you think a heavy truck **should** do, not what they always have done. Then give Ward LaFrance the chance to prove that it can deliver, right to your "ideal" specifications. If we have not yet appointed a dealer in your community, write our Sales Department outlining your requirements as fully as possible.

WARD LAFRANCE

TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC.

ELMIRA, NEW YORK

FRANCHISES AVAILABLE in several top-notch localities. Especially desirable for established dealers handling leading smaller, non-competitive makes . . . For complete details of the new profit-making Ward LaFrance Dealer Plan, write our Sales Department today.

SCHRAMM OFFERS THESE *Exclusive* COMPRESSOR • ECONOMY FEATURES

This Stands for Honorable Service for Our Country

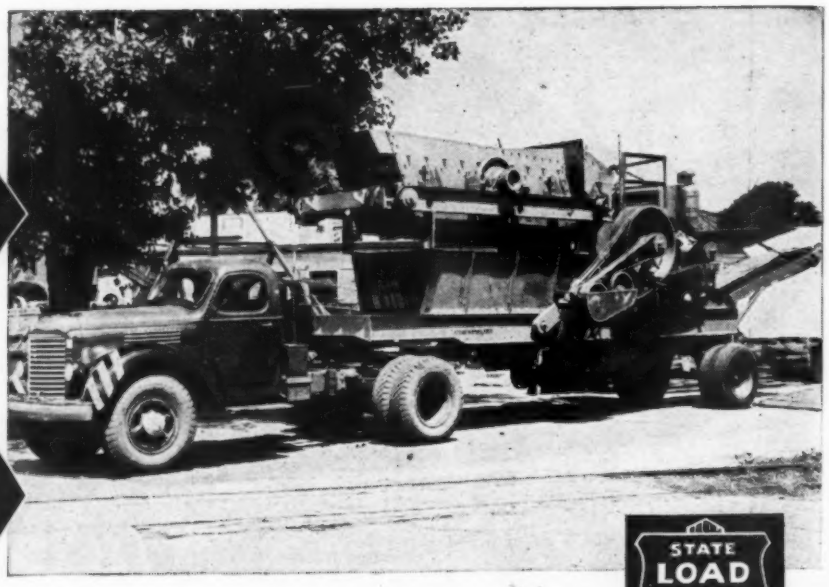
Four features make Schramm Air Compressors ideal for construction jobs . . . (1) 100% water cooled (2) Compact—lightweight (3) Mechanical intake valve (4) Forced feed lubrication. These features enable you to do your compressed air job quickly—easily—economically!

Schramm Air Compressors are designed for heavy duty, continuous service, with minimum attention. They are built in sizes ranging from 20 to 420 cu. ft. of actual air, in every type of mounting and assembly. Lightweight, compact, sturdy, they are easily moved about on the job. Other Schramm features include long life discharge valve and complete push button electric starter. Make your construction jobs easier by using a Schramm Air Compressor to get air wherever needed. Write today for details contained in new, informative booklets just published.

SCHRAMM INC.

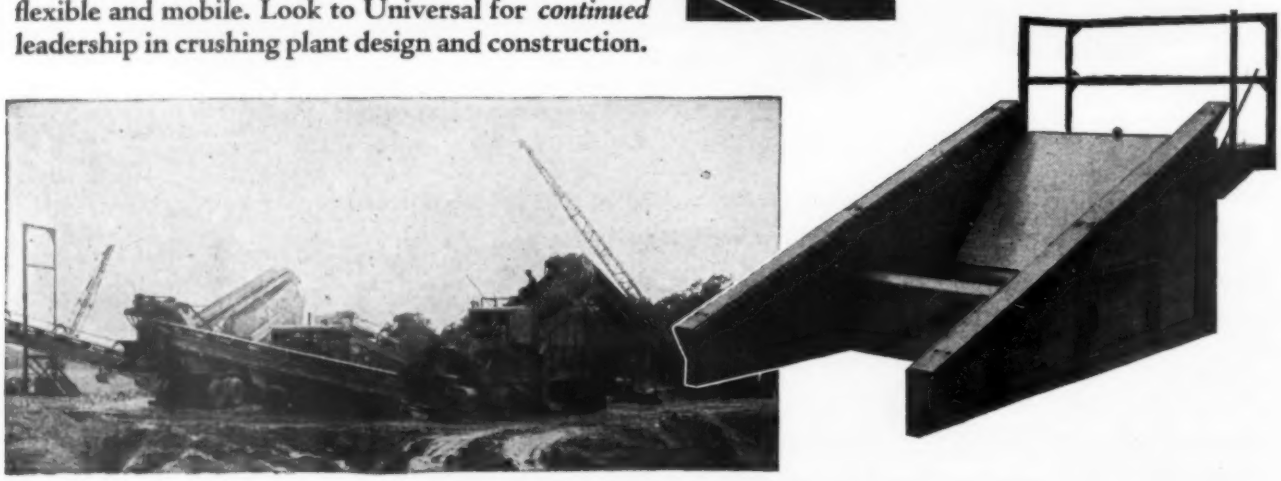
THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

This beats "LOW BRIDGE" *and* "LOAD LIMIT"!



The Universal Two-Unit screening, crushing and loading plant shown below, built for Rock Roads Construction Co., Chicago, Ill., can be *squeezed down* in a jiffy to compact units that will readily clear overhead structures, meet highway loading restrictions, and "highball" to a new gravel pit at a merry clip. The wedge-shaped unit pictured below slips out and permits screens to be lowered. Delivery conveyors quickly fold back as shown. The primary crushing unit is illustrated above, and the secondary reduction unit at right.

This plant averaged 300 cu. yds. per hr. on the Janesville, Wis. airport job recently — is quickly returning its cost. Universal quarry plants are just as flexible and mobile. Look to Universal for *continued* leadership in crushing plant design and construction.



UNIVERSAL ENGINEERING CORP.
631 C Ave. West Cedar Rapids, Iowa

ARMY NAVY

UNIVERSAL

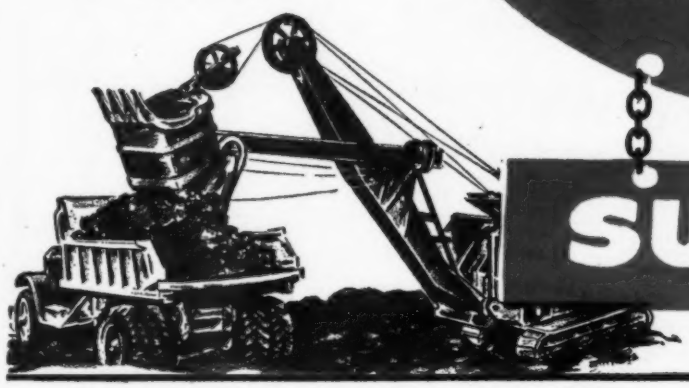
ROCK AND GRAVEL CRUSHERS, CRUSHING ROLLS, HAMMER MILLS, COMPLETE CRUSHING AND SCREENING PLANTS, WASHING PLANTS, ASPHALT PLANTS, SPREADEROLLERS.

For Winter

Use the COLD-WEATHER OIL that works better 2 WAYS!

AMALIE
PENNSYLVANIA
H-D OIL

SUB-ZERO



Here's a point to remember when you decide it's time to change to winter-grade oil.

What you want is a motor oil that will not only flow freely at low temperatures but will also *cling* to piston and cylinder walls instead of draining off completely into the crankcase when the engine is not running.

The reason AMALIE H-D Sub-Zero excels for cold-weather operation is its *greater oiliness* — 20% greater by test — which permits this oil, despite its low pour point, to cling to vital engine parts. This assures easy starting and smooth engine operation regardless of temperature — cold snap or mild spell.

The *Complete* Heavy-Duty Oil for Essential Uses

AMALIE H-D is refined from 100% Pennsylvania crude and has all the important characteristics of a *complete* heavy-duty oil. It has the necessary detergent and dispersive qualities . . . cleanses and washes away carbon and other harmful products of combustion. Its anti-oxidant action guards against the formation of varnish and sludge deposits on vital parts.

AMALIE H-D gets its *greater oiliness* from a special refining process which preserves the natural lubricating qualities of selected Pennsylvania crude. For winter — use AMALIE H-D Sub-Zero.

Ask your AMALIE Distributor, or write Dept. C9.

See Your AMALIE Distributor for this A.C.D.S. Test

Your AMALIE Distributor offers you the opportunity to have the used oil from the crankcases of trouble-some engines tested and analyzed impartially by skilled laboratory technicians. AMALIE CRANKCASE DRAINALYSIS SERVICE has helped many operators put an end to costly troubles and break-ups. No obligation. Ask your nearest AMALIE Distributor, or write for details.

AMALIE DIVISION
L. SONNEBORN SONS, INC.
88 Lexington Avenue, New York 16, N. Y.
Refineries: Petrolia and Franklin, Pa.
Plant: Nutley, N. J.

In the Southwest
SONNEBORN BROS., Dallas 1, Texas

TRUSCON WELDED STEEL FABRIC

for long-lasting, economical highways!

Truscon Welded Steel Fabric is a permanently bonded mesh of tremendously strong wire, that imparts great strength and long life to concrete. It assures:

Resistance to cracking during setting period.
Tensile strength against subgrade friction.
Resistance to cracking due to warping.
Resistance to development and opening of cracks.
Resistance to slab separation.
Decrease of spalling and disintegration.

Ask experienced Truscon highway engineers to help you design and build better roads for communities you serve.

TRUSCON STEEL COMPANY • Youngstown 1, Ohio
Subsidiary of Republic Steel Corporation

TRUSCON
WELDED STEEL FABRIC
• *Covers the Continent* •

ONE-PIECE TURNTABLE

KEEPS MACHINERY ALIGNED

KOEHRING 605

ONE WELDED UNIT

Machinery stays aligned on the new Koehring 1½ yard shovel. Precise alignment prolongs life of the machine, prevents undue wear, cuts upkeep cost.

SIDESTANDS ARE INTEGRAL

Sidestands supporting the horizontal shafting on the new Koehring 605 are integral parts of the massive turntable, securely welded on, permanently joined to keep shafting in lasting alignment.

GEAR HOUSING WELDED IN

Because a separate, bolted-on housing might work loose to throw vertical shafting out of line, the bevel swing and traction gear case on the new Koehring 605 is welded directly into the turntable. No bolts used to join housing and turntable.

Ask For Your 605 Catalog Today

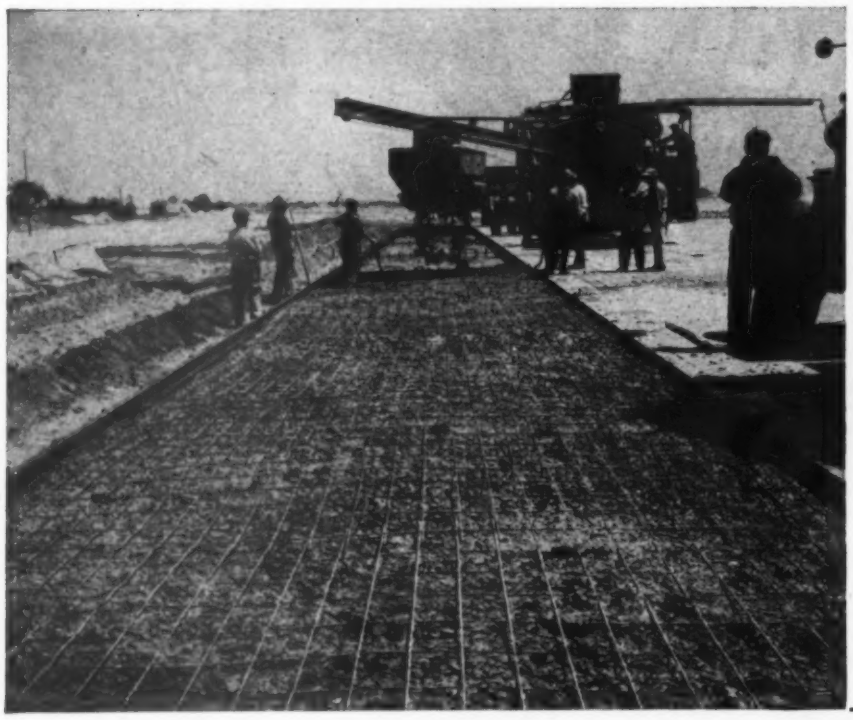
KOEHRING COMPANY
MILWAUKEE 10
WISCONSIN

KOEHRING K HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

For the World's Finest Airport

—*the most widely used concrete reinforcement*



Engineers make long life and economy doubly certain in these sewers, which will drain the new airport, by specifying welded wire fabric for reinforcing concrete pipe.

The miles of runways, taxi strips, roads and aprons at the great new Idlewild Airport will last longer and require less maintenance because they are reinforced with American Welded Wire Fabric.

At the great new Idlewild Airport the many miles of concrete runways, taxi strips, aprons, roads and concrete pipe sewers are being reinforced with American Welded Wire Fabric.

THE QUALITIES which induced engineers to specify Welded Wire Fabric reinforcement on this outstanding project have been proved during the years of satisfactory service on the country's concrete highways.

Made of cold drawn steel, prefabricated by electric welding, American Welded Wire Fabric provides the superior reinforcing value of closely spaced high yield point steel wires, even for the widest highway ground slabs. It is being installed at Idlewild in 12-inch thick concrete in 12½-foot lanes on the 200-foot wide runways. It gives the slabs strength to resist shocks and strains in all directions. Should cracks appear, the welded wire fabric prevents them from spreading. It also eliminates spalling and heaving.

Other advantages? Engineers and contractors can tell you that with American Welded Wire Fabric you use less steel, reduce construction time and cost; that it is easily handled, quickly installed, lies flat and always stays in place.

When you are planning peacetime highways, plan to give them the extra strength and durability which assure extra years of useful service. That has been done on existing highways by billions of square feet of U·S·S American Welded Wire Fabric.

UNITED STATES STEEL Presents the THEATRE GUILD On The AIR Every SUNDAY EVENING AMERICAN Network (Blue)

AMERICAN STEEL & WIRE COMPANY

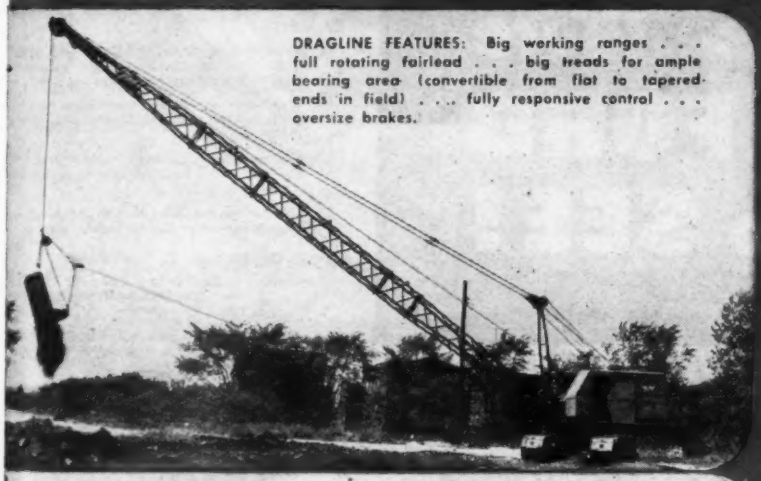
Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

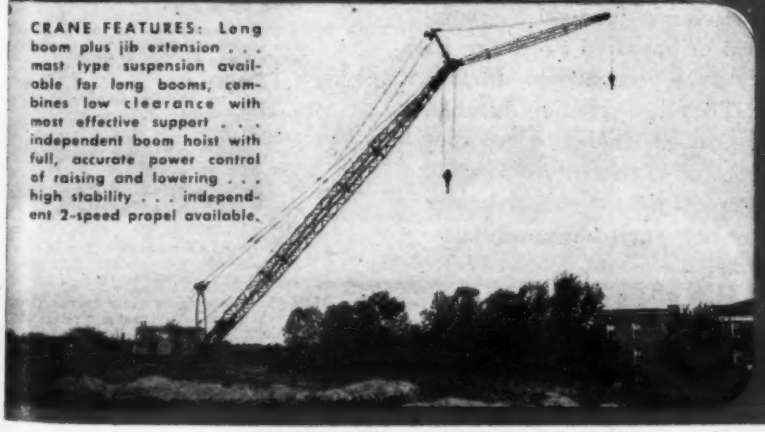
UNITED STATES STEEL

U·S·S American WELDED WIRE FABRIC

SHOVEL FEATURES: Strong, light boom with big point sheaves for effective application of digging force . . . independent, positive, twin rope crowd . . . high lip, curved door dipper for fast filling and dumping . . . rock and dirt.



DRAGLINE FEATURES: Big working ranges . . . full rotating fairlead . . . big treads for ample bearing area (convertible from flat to tapered ends in field) . . . fully responsive control . . . oversize brakes.



CRANE FEATURES: Long boom plus jib extension . . . mast type suspension available for long booms, combines low clearance with most effective support . . . independent boom hoist with full, accurate power control of raising and lowering . . . high stability . . . independent 2-speed propel available.

Remarkable balance of speed and power in crowd (or drag), hoist and swing gives the 38-B the smooth, fast operating cycle that spells big output on every job. Selection of the most modern materials, efficient weight placement and widespread use of selective hardening result in a machine with ample strength for continued tough digging, but without a pound of excess weight to slow it down. Anti-friction bearings and oil-enclosed gears add to smooth operation and long life. Big, simple machinery units are easily accessible, require minimum maintenance for top performance. Equally effective as shovel, dragline, clamshell, or crane, the 38-B is a real postwar excavator, thoroughly field tested.

It's new . . . it's fast . . . it's long-lived! It's just what you need in a 1½-yd. machine to put you in good position in the competitive peacetime years. Find out the full story on the 38-B from your Bucyrus-Erie Distributor.

36E45C

BUCYRUS-ERIE
SOUTH MILWAUKEE, WISCONSIN

MORE MODELS IN PRODUCTION . . . 1,000 A DAY COMING!

You SEE more Ford Trucks because there are MORE FORD TRUCKS to SEE!

100 H.P. V-8 Ford *90 H.P. SIX*

Ford Trucks are America's Number-One choice—proved by registration figures. And if you've ever owned or operated Ford Trucks you know *why* they're favorites. They save you money—in first cost, operating cost, maintenance cost. They are reliable, durable, simple and easy to service. Wherever you go, there's competent Ford service. There's a Ford Truck among the 42 current models and types that will do a good, efficient, economical job for you. Ask your Ford Dealer to tell you about the many new engineering advancements, and the latest priority regulations.

YEAR AFTER YEAR, OFFICIAL REGISTRATIONS SHOW MORE FORD TRUCKS ON THE ROAD—ON MORE JOBS—FOR MORE GOOD REASONS

32 GOOD REASONS WHY TODAY'S NEW FORD TRUCKS ARE THE GREATEST IN FORD HISTORY

THE ENGINE

1. New aluminum alloy cam-ground pistons with 4 rings each—for improved oil control.
2. New steel-cored SILVALOY connecting rod bearings—provide 2½ to 3 times longer life.
3. Larger capacity oil pump—for improved lubrication and longer bearing life.
4. Rear main bearing oil seal—for added oil economy.
5. Oil filter, renewable cartridge type—to keep oil clean and reduce wear.
6. Removable plate at bottom of oil pan—for easy access to clean oil pump screen.
7. Balanced carburetion—for increased economy and efficiency.
8. Latest type self-washing oil bath air cleaner—keeps out destructive dirt, thus greatly prolonging engine life.
9. Thermostatically controlled exhaust by-pass valve regulates intake manifold temperature—for better fuel vaporization and economy.
10. Intake manifold—improved design for easy vacuum line connections.
11. New sealed-dry, V-outlet distributor—water-sealed, short-proof, air-cooled, trouble-free—streamline-molded of dielectric bakelite, with neoprene-coated high-tension leads protected by heavy ozone-resistant plastic jackets.
12. New aluminum timing gear—for longer life and silent operation.
13. Valve springs shot-blasted and rust-proofed—for longer life.
14. New stronger piston pins—for longer life.
15. New design interchangeable cylinder heads—for simpler, lower cost servicing.
16. More efficient exhaust valve cooling—for longer valve and cylinder block life.
17. High-efficiency fan—for better cooling.
18. Pressure-valve radiator cap—to prevent loss of coolant and improve engine operating efficiency.
19. New bronze thrust washer in water pumps—to prevent leaks and give longer life.
20. Oil-resistant synthetic rubber engine mounts with new design front cups—for longer life.
21. Oil pan divided at clutch housing—provides easier clutch servicing.

THE CHASSIS

22. Larger clutch in Tonner truck. 44.7% increase in friction area—for longer life.
23. Four-speed transmission now standard in Tonner—for more efficient operation and longer life.
24. Four-speed transmission, internal spring reverse lock—eliminates latch on shift lever.
25. New-design transmission main shaft splines—to provide positive gear mesh under load.
26. Thrust washers added at ends of four-speed transmission countershaft gear—for longer life.
27. Larger tires now standard on all chassis—to obtain maximum life from present-production tires.
28. Wheel rims uniform wide-base on each model—for better tire life and simplified servicing.
29. Two-speed axle vacuum shift—for easier control and elimination of separate shift lever.
30. Additional sill cross-member at rear of cab—for greater stability and longer cab life.
31. Cab door window glass mounted in metal frame—for greater strength to prevent glass breakage.
32. Larger, adjustable-arm rear-view mirror—for increased visibility and safety.

"Easy - - - WITH LINK-BELT SPEEDER!"

SMOOTH, POWERFUL ACTION OF LINK-BELT SPEEDER UNIT MAKES TRICKY JOB PROFITABLE

After opening a line of trench, this LS-85 is laying cast iron pipe on a new sewer job for Springfield, Mass., a delicate job that looks easier than it is, and *is* easier than it might be, without the power, speed and easy control typical of the Link-Belt Speeder machine. Contractors find these features important factors in profitable operations.

QUICK CONVERTIBILITY HELPS, TOO!

Interchangeable attachments, quickly fitted, enable the Link-Belt Speeder "shovel-crane" to keep profitably busy at a variety of jobs. Link-Belt Speeder "Shovel-Crane" is First Machine on the job, Last to Leave!

What is YOUR *State doing about Post-War Construction Plans for* ROADS . . AIRPORTS . . SEWAGE TREATMENT AND WATER PURIFICATION PROJECTS?

Millions of jobs and assurance against post-war depression are involved in pending construction programs. Make sure your state is ready to start its program.

For Prompt, Efficient, Convenient Sales and Service:
There is a Link-Belt Speeder Distributor Located Near You

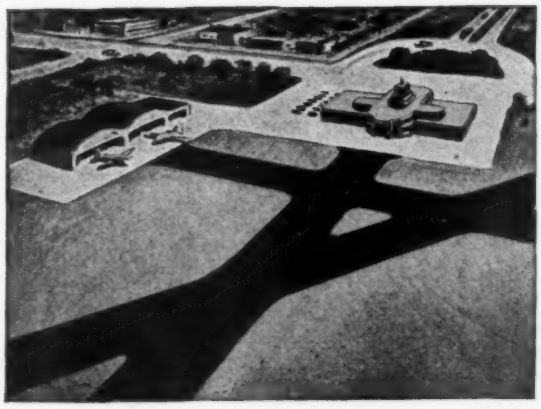
10083

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

Planning on building Airports? ...plan on



Asphalt

low cost
speedy construction
easy maintenance

ASPHALT is the ideal material for airport runway and apron construction. It has good visibility and shock-absorbing qualities.

It is *low in cost,* because local aggregates can frequently be used. In addition, load-bearing requirements of runways can be increased at any time, utilizing the original material by adding asphalt layers as needed.

It can be *laid quickly* and used without delay. This is of particular advantage if you plan to add or widen runways later.

It is *easy to maintain* by spot patching and resurfacing as needed, at low cost. Runways can be kept in good-as-new condition at all times.

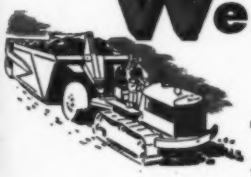
A Standard Oil Asphalt Representative will be glad to discuss types of construction and methods of using Asphalt in airports. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Representative nearest you.

Buy and hold more Victory Bonds

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

Cutting teeth for a helical gear in one of the precision hobbing machines.

We cut our teeth!



To bring you the finest in crawler tractors . . . to assure efficient, economical operation, all gears and spline shafts for Oliver "Cletrac" tractors are cut in our own plant. In this way, we can guarantee the close tolerances . . . the precision fits so necessary for smooth, quiet operation and freedom from excessive maintenance.

Cutting our own gears is but one extra step we take to assure the *extra* quality that is inherent in every Oliver "Cletrac" tractor part. Materials, workmanship and equipment are all based on one standard . . . the built-in quality that means added years of service.

Maintenance of that standard enables your Oliver "Cletrac" dealer to offer you the finest in crawler tractors . . . for your every need.

CLETRAC

OLIVER CORPORATION Cletrac

a product of

The OLIVER Corporation

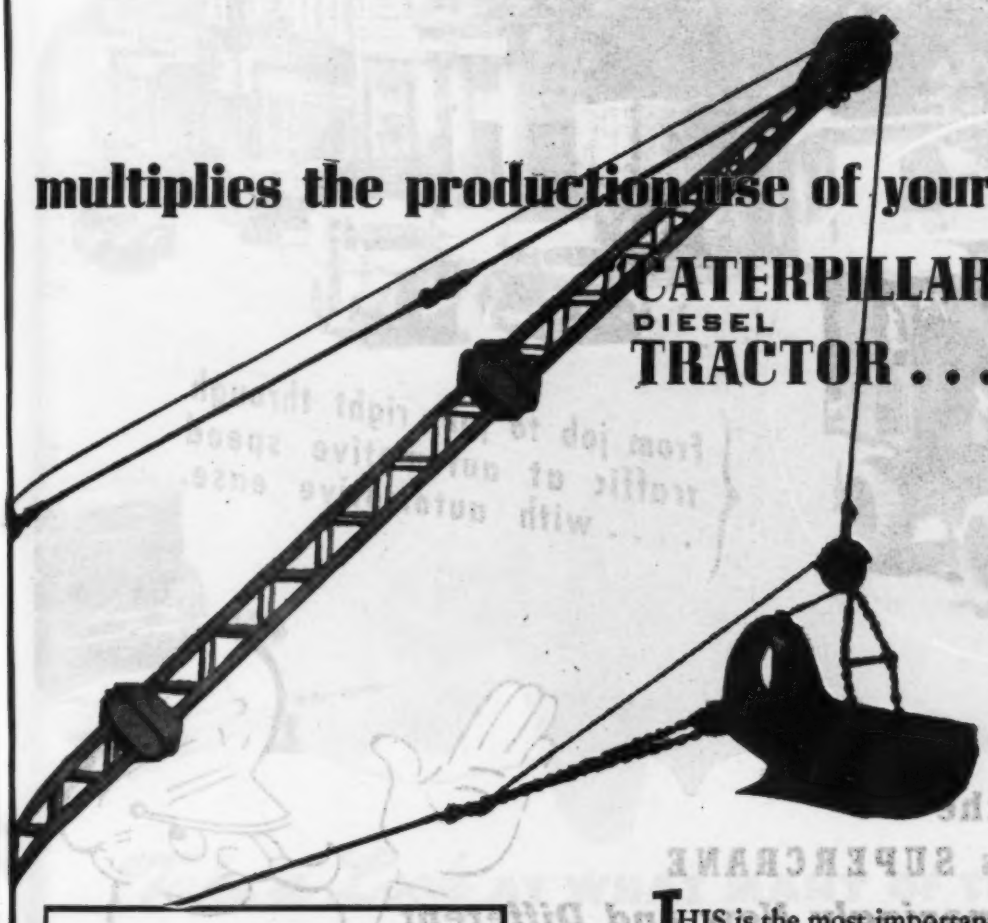
HYSTER proudly presents the

HYSTAWAY . . .

A DRAGLINE, CLAMSHELL AND CRANE COMBINATION
for use with Track-Type Tractor and Bulldozer...
All in One Working Unit

Sold and serviced by "Caterpillar" dealers and distributors throughout the world.

multiplies the production use of your "CATERPILLAR" DIESEL TRACTOR . . .



SIZES. Available for "Caterpillar" models D6, D7, D8.

DRAGLINE AND CLAMSHELL. Handles (on a D7) ½ cu. yd. dragline bucket; ⅜ cu. yd. digging clamshell or ½ yd. rehandling clamshell. Other models in proportionate capacities.

CRANE. Swinging live boom, with maximum lifting capacities in any position.

MOUNTING. On in 2 hours (with 2 men); off in 1 hour.

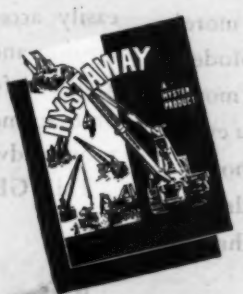
MOBILITY. Full tractor mobility is retained. Crawler track oscillation is not impeded. Tractor rigidity when desired is accomplished by crank control at masthead.

OPERATION. Conventional shovel and crane controls. 240° swing at speed of 4.5 RPM.

THIS is the most important product announcement Hyster Company has made in the 16 years we have specialized in building tractor equipment.

The addition of a Hystaway to a "Caterpillar" track-type tractor gives you *one piece* of production machinery that combines tractor — bulldozer — dragline, clamshell and crane.

Back of Hystaway lies the best engineering skill in the tractor equipment business . . . Years of field tests in various sections—under all working conditions—have proved Hystaway's performance, stamina and versatility.



READY FOR YOU . . .

A completely illustrated booklet on Hystaway—how it's built—what it does—how it does it. Write for your copy.

HYSTER COMPANY

2995 N.E. Clackamas, Portland 8, Ore.
1895 North Adams, Peoria 3, Illinois

"WRAPS" ARE OFF

The Latest and Greatest Development of a 5-Year-Old INDUSTRY "FIRST"

"Fathered" by the World-Famous SUPERCRANE

. . The Amazingly New and Different

General Type 10 MODEL 105

ONE-MAN . . . ONE-ENGINE . . . ON RUBBER

Five years ago General "scooped" the industry with a great "first"—the one-engine, one-man operated, pneumatic-tired Supercrane. Carrying this development a great stride forward, General now takes the "wraps" off the *original* "Machine of Tomorrow." First announced more than a year ago, General's revolutionary Type 10, Model 105, is a profit-building rig that will go out and do more kinds of work—faster, better and cheaper—than you ever believed possible with a single machine . . . ½-yard shovel, crane, backhoe, dragline, clamshell, magnet and piledriver "rolled into one" and rolling with automotive smoothness on a cushion of air.

Here is mobility you must see in action to appreciate. Here is easy, positive, instant-response, metered air control you can "feel" and guide with your fingers at all times. Here is a design so practical that swing, travel and boom hoist may be performed independently or simultaneously.

Test-Proven Advancements

Fast highway travel (20 "plus" miles per hour); optional 4-wheel drive; air booster steering; independent, easily accessible assemblies; heavy-duty engine, transmission and clutches; self-counter-weighting machinery; 4 speeds forward and reverse; quick interchangeability of attachments . . . are only a few of the remarkable test-proven advancements. Write for the full story today!

THE GENERAL EXCAVATOR CO., Marion, Ohio.

GENERAL EXCAVATOR CO.

Power-Driven HYDRAULIC PUMPS BY BLACKHAWK

Take a Look AT WHAT MANY OF THE LEADING ROAD MACHINERY BUILDERS WILL HAVE FOR YOU ON THEIR *New Equipment*

ALERT equipment manufacturers are going to make you happy! Yes, sir! The big leaders are installing POWER-DRIVEN Blackhawk Hydraulic Controls on the equipment you will be buying. Soon you, too, can have the extra *safety, comfort control and economy* which this amazing new pump gives to the operation of snow plows, bulldozers and much other road machinery.

And, the change-over of old equipment is so simple! No complicated power take-offs. When buying new machinery, always specify, "equip it with POWER-DRIVEN Blackhawk Hydraulic Controls." Or, in writing your equipment manufacturer (or us) for information — refer to the new P-104 Blackhawk POWER-DRIVEN Pump!

A Product of BLACKHAWK MFG. COMPANY, Dept. RS Milwaukee, Wisconsin

Always Specify . . . "equip it with

BLACKHAWK HYDRAULIC CONTROLS"

Here's what CECO gives you for faster low-cost road building

ACCURATE PRE-BIDDING INFORMATION

Ceco takes the guesswork out of bidding by supplying accurate data, so you can bid to get the job . . . and make money on it, too.

BLUEPRINTS OF ENGINEERING DETAILS

Ceco engineers do the detail work for you in supplying all engineering data on reinforcing and other materials for the job.

ONE ORDER DOES IT ALL

Ceco streamlines roadbuilding. In one complete order you can specify everything you need. Material is delivered as wanted and on time.

Metal center strip in place; dowel bars supported and ready for support; expansion joint in position.

22 CECO OFFICES AT YOUR SERVICE

There is a nationwide network of Ceco offices to serve you. So when you specify Ceco Highway Products, you know you get fast, dependable delivery from the nearest convenient warehouse . . . and always there's a Ceco engineer watching every detail . . . saving you time and money. Yes, here's highway service that's everywhere at once.

Placing the welded wire fabric, illustrating ease of handling.

Cecure compound applicator in operation — final step in highway building.

Investigate Ceco Cecure Curing Method

Ceco's new Cecure applicator offers these advantages:

1. **Gives positive application of Cecure curing compound.**
2. **Works 20 times faster than old style method.**
3. **Provides uniform curing — reducing danger of cracking.**
4. **One operation does the job.**

CECO STEEL PRODUCTS CORPORATION

Highway Products Division—5701 W. 26th St., Chicago, Ill.

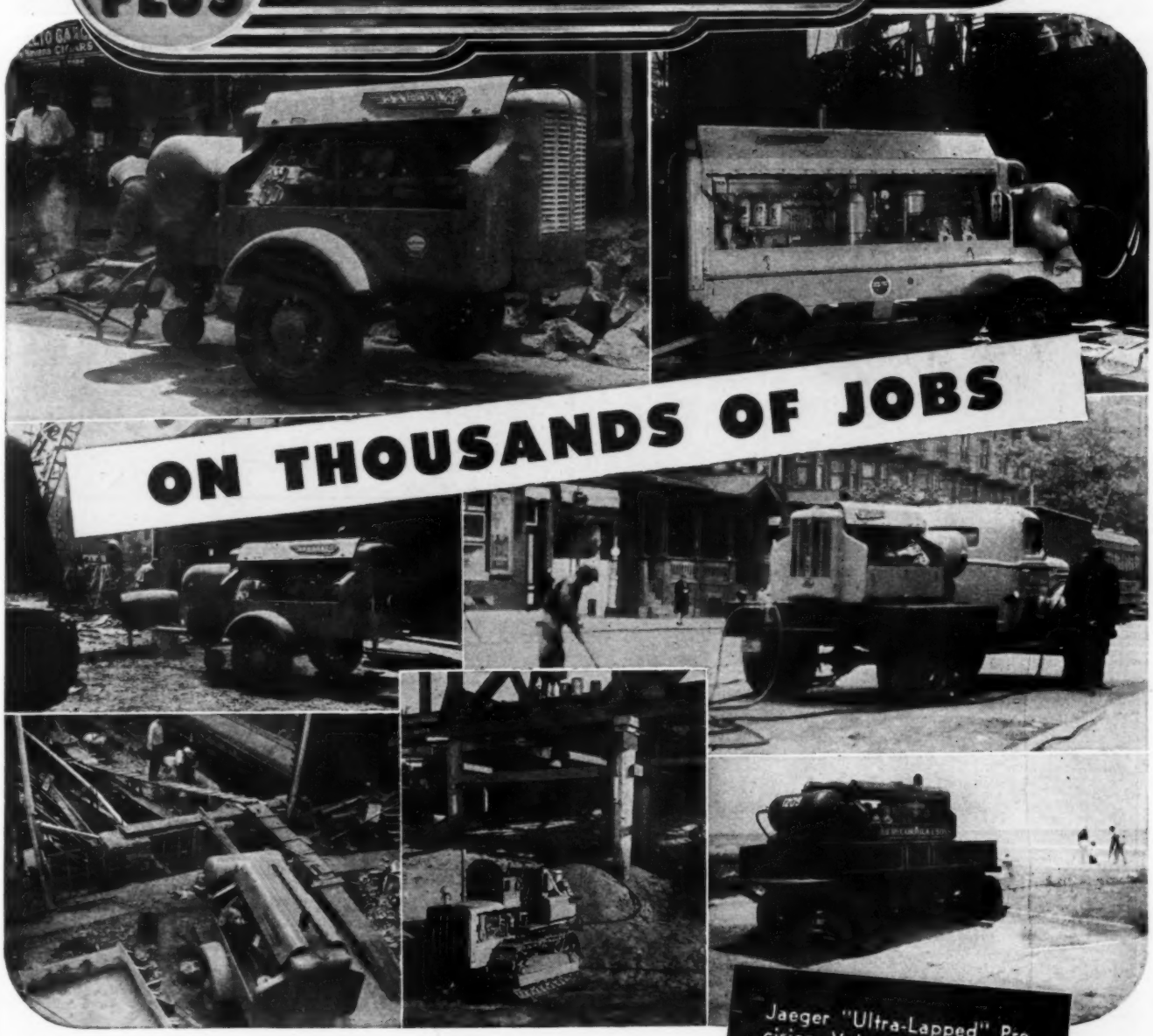
Manufacturing Division, Concrete Engineering Division, Sheet Steel and Wire Division

Convenient Check List of Ceco Highway Products

Welded Wire Fabric • Metal Center Strip • Dowel Bars • Stake Pins • Dowel Bar Supports • Expansion Joints • Dowel Bar Sockets • Cecure Compound • Sub-Grade Paper

ENGINEERING MAKES THE BIG DIFFERENCE IN CECO CONSTRUCTION PRODUCTS

AIR PLUS JAEGER COMPRESSOR



ON THOUSANDS OF JOBS

. . . from coast to coast, Jaeger trailer, truck and tractor-mounted "AIR PLUS" Compressors are delivering more air, cooler air, drier air . . . with smooth-running, precision-built units that set new standards for economy of fuel and upkeep. Sold and served by Jaeger distributors in over 100 cities. *Ask for Catalog JC-5.*

Jaeger "Ultra-Lapped" Precision Valves can hold air above 90 lbs. pressure for 20 to 25 minutes (5 to 10 times longer than others — THAT'S PROOF YOUR TOOLS ARE GETTING ALL THE AIR!

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"FLEET-FOOT" Loaders

"SPEEDLINE" Concrete Mixers

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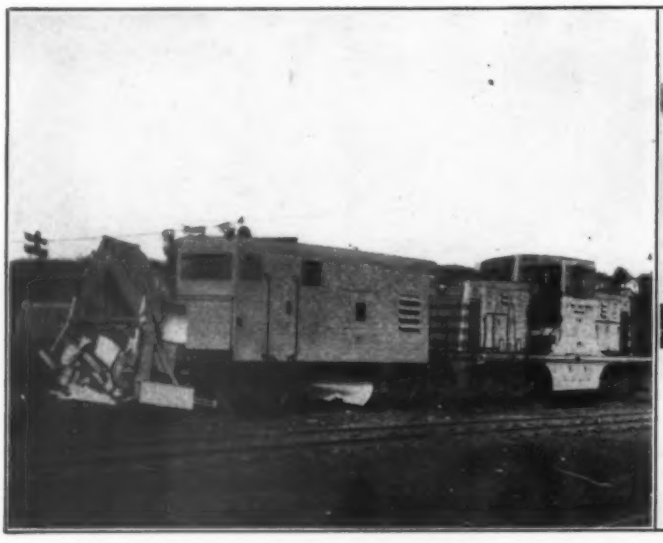
JAEGER *Engineered* EQUIPMENT

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS

MASTER OF SNOW AND ICE

BROS ROTARIES BY THE HUNDREDS were used by the Army to keep military roads and airports open when demands of strategy called for undelayed advances in both Europe and America.

THE NAVY USED BROS ROTARIES to keep the airports open so that the heavy demands of flight transportation could be met daily without needless and costly delays or interruptions.



RAILROADS USED BROS ROTARIES to keep their main lines open and to remove the ice hazard in open stations and in congested switch yards. A loading chute permits side-loading into cars.

CITIES, COUNTIES AND STATES used Bros Rotaries to keep the streets and highways open for the Nation's traffic. Wm. Bros Boiler & Manufacturing Company, Minneapolis 14, Minnesota.

Give us your Snow Problems—we'll give you the answer

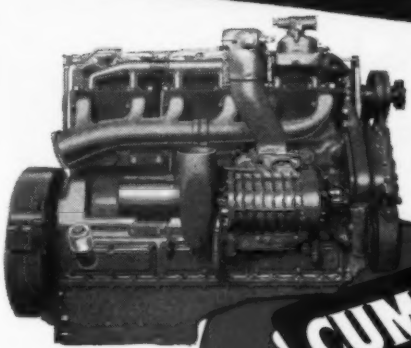
BROS

FABRICATORS OF STEEL • BOILERS • STOKERS • TANKS • ROAD EQUIPMENT

POWERED FOR higher PROFIT

Consider these advantages in standardizing on Cummins Dependable Diesels for your heavy-duty power requirements—automotive, portable or stationary. Three models—150, 200 and 275 hp—have the same basic design and practically the same mounting dimensions . . . weights as low as 10½ pounds per horsepower . . . many interchangeable parts . . . a single service procedure. Results: in effect, you meet varying power needs with "one engine" . . . you save engine weight and space . . . you reduce parts inventory . . . you simplify the mechanic's job, cut service costs.

CUMMINS ENGINE COMPANY, INC., Columbus, Indiana



CUMMINS Dependable DIESELS

SINCE 1918...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS

Read the Record

1. Most of the rubber-tired earth and ore-moving equipment on the Mesabi Iron Range—the world's largest—is Cummins Diesel-powered.

2. More than 90% of the long-line, franchise-operated, heavy-duty, diesel-driven trucks in the 11 Western States are Cummins Diesel-powered.

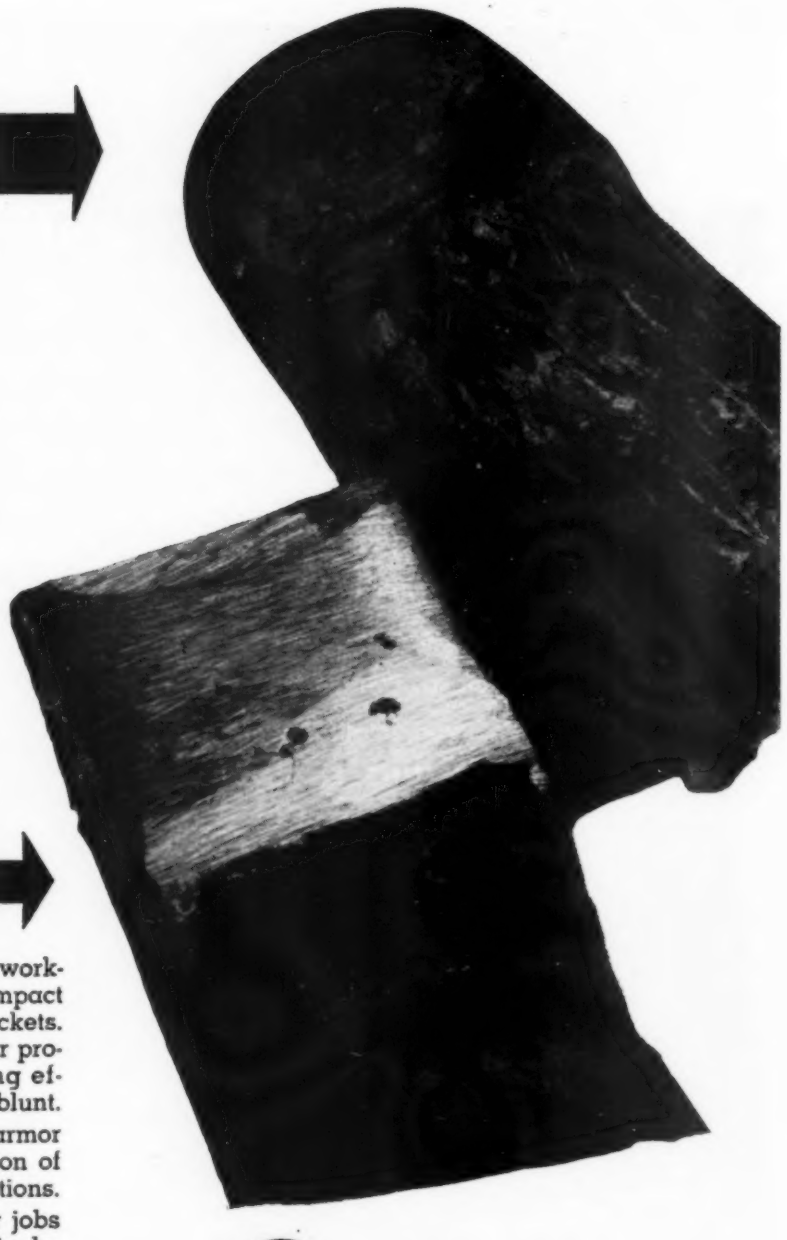
3. In the world's greatest petroleum producing area—the Mid-Continent region—Cummins Diesels outnumber any other make of diesel engine.

4. More yarders, loaders and trucks in the Northwest Woods are powered by Cummins Diesels than by any other diesel.

Blunt isn't it?...

but MIR-O-COL Hard-Facing will rebuild your Bucket-Teeth

Sharp like this



When your excavating equipment is working in heavy granite or shale and sand, impact and abrasion grinds teeth and lips of buckets. This wear is one of the costly losses on your production chart, because material handling efficiency of the bucket drops as teeth wear blunt.

MIR-O-COL metal rods are specified as an armor of hard alloy applied over a built-up section of either mild steel or an insert in such conditions.

Hard-Facing rod No. 1 is recommended for jobs where a thin overlay of extreme hardness is desired to protect against excessive abrasion. Hard-Facing rod No. 2 is an all-purpose type for use where severe impact as well as abrasive conditions will be met.

MIR-O-COL Hard-Facing can be applied by either oxy-acetylene or electric arc methods. These hard-facing materials cost only a small portion of the price of new teeth, and—in addition—provide plus advantages of reduced maintenance time and improved operating efficiency of equipment at work. Stocked now by supply houses in most construction centers, MIR-O-COL Hard-Facing metals are easy to buy. Experience proves they are easy to apply. See your welding supply company or write to MIR-O-COL.

SEND FOR YOUR FREE COPY

To learn more about the application of MIR-O-COL Alloy Company hard-facing rods, write to your local welding supply jobber or direct to the company, attention Department B-16. We will send you a copy of "Weldors' Guide to Successful Hard-Facing."

MIR-O-COL
HARD-FACING RODS
ALLOY COMPANY
2416-60 EAST 53RD STREET, LOS ANGELES 11, CALIFORNIA

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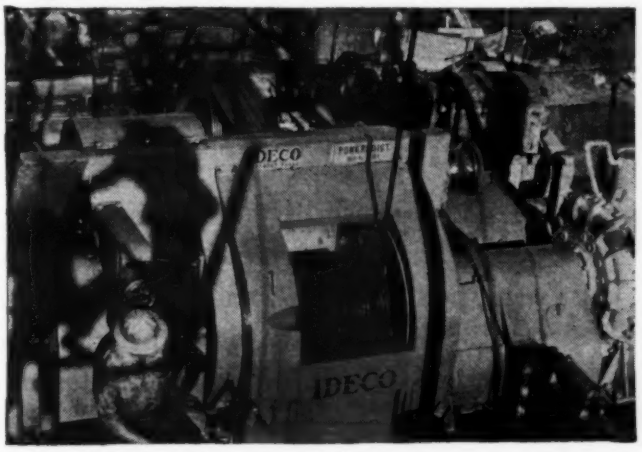
Here is the one truly modern clutch for all heavy duty industrial drives.

It controls power and torque through a cushion of air —with as firm a grip or as light a grip as the job requires. It has no springs, arms, levers or toggles—requires *no* lubrication and little maintenance.

It is the Fawick Airflex Clutch—proved for superior performance and economy—in hundreds of industrial applications and in thousands of Diesel-driven Navy ships.

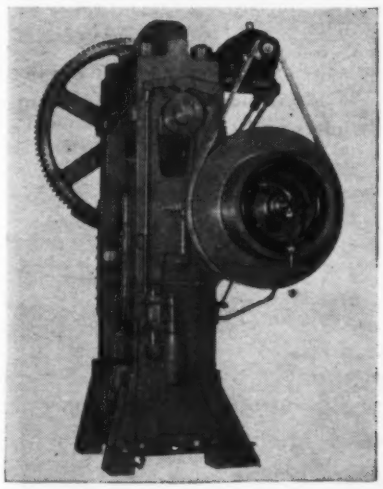
Let us help you engineer clutch trouble *out* of your machines. Book on request.



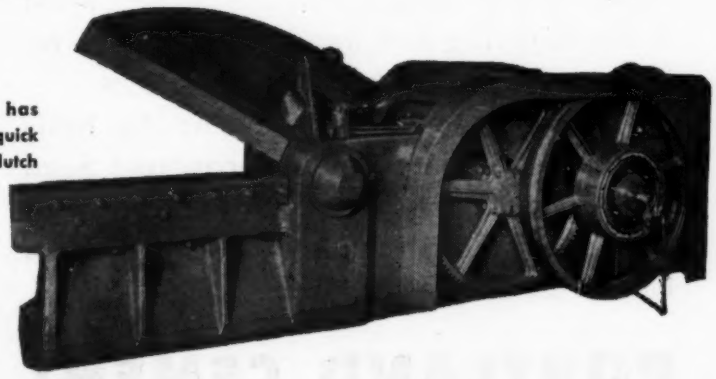
Oil-well drilling rig—equipped with 11 Fawick Clutches.

▲ Modern power shovel gives full-time operation through dependable Fawick Clutches.

Steel rolling mill Fawick-equipped for smooth, even power.



◀ Heavy duty press has smooth starts and quick stops with Fawick Clutch and Brake.



▶ Alligator shear operates through Fawick Clutch and Brake.

FAWICK *Airflex* CLUTCH

FAWICK AIRFLEX CO., INC. • 9919 Clinton Road, Cleveland 11, Ohio

In Canada, Reynold-Coventry Ltd., Montreal, Toronto, Vancouver • In Britain, Clutto Engineers, Ltd., Bradford, England

Soil-Cement . . . a Big Value for Secondary Roads

Get the utmost benefit from Federal Aid and county secondary and feeder road funds in your postwar construction program.

Soil-cement used for light traffic roads and streets, will provide more miles of durable all-weather surfaces within limitations of the average county, township or town paving budget.

Soil-cement construction is economical because about 90 per cent of required material is on the existing roadway. Old high maintenance cost gravel and stone roads can be rebuilt into strong, long-lasting pavements with soil-cement.

The superior value of soil-cement is demonstrated by its service record and by comparison with the cost and service of other types of road surfaces intended for similar traffic.

More than 39 million square yards of soil-cement paving in all parts of the United States is giving low annual cost service on light traffic roads, streets and airports.

Why not make soil-cement the basis of your secondary paving program? Send for "Specifications For Soil-Cement Road and Street Construction." Mailed free in United States and Canada.

May, 1945, picture of soil-cement road built in Winnebago County, Illinois, in 1936, shows road in excellent condition after nine winters and spring thaws.

Soil-cement road under construction by Winnebago County forces near Rockford, Illinois, in 1936.

PORTLAND CEMENT ASSOCIATION

Dept. A10-28, 33 W. Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

★ ***Buy and Keep More War Bonds*** ★

MAKE HIGHWAY FUNDS REACH FURTHER...

GET MORE WORK DONE *with*

MULTI-PURPOSE FWD TRUCKS

THE ONE TRUCK FOR MANY JOBS

FALL — Road patrolling; snow fence hauling.

WINTER — Snow clearing.

SPRING — Road conditioning and construction.

SUMMER — Earth-moving; material hauling.

YOU get more than just a truck in every FWD you put into highway service... for FWDs are engineered to do many jobs beyond the limitations of "conventional drive" trucks.

Snow clearing is one of the scores of jobs FWDs do better, faster, more economically. And throughout the other seasons of the year, the same FWDs that are so superior in the toughest of snow-clearing problems, have that extra ruggedness, stamina and endurance needed for all-year highway duty... hauling heavy snow fence; leveling washboard surfaces, ruts and sinkholes; hauling crushed stone, gravel, sand, concrete, asphalt; pulling scarifiers, graders and other heavy equipment ... using power on all wheels to do *more jobs*, to cover more mileage in all phases of road maintenance and construction, faster, safer, at less cost ... to make highway funds go further. Write for bulletin.

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis.

Canadian Factory: KITCHENER, ONTARIO

FWD MODEL SU

Buckeye Trenchers
Make The Tough Jobs Easy

eason so many successful contractors use Buckeye rs is simple. They produce when the going gets make money on trenching jobs, you must be able tough spots in stride, and Buckeye Ladder Type do just that, cutting anything short of solid rock. e Model 410, for example. Ruggedly constructed, ve cutting feeds in each of three forward speeds r what kind of material you strike, down to the rdpan, you can put the 410 through it in the ible time.

0 you can dig while tractioning backwards, reverse digging feeds. Trench can be cut right foundations, sidewalks can be tunnelled,

trench from 18" to 24" wide and up, to mall size—overhead clearance only 6' 8"—vlers only 57" — with shiftable conveyor it to dig in narrow confines of alleys, etc. lks and lawns—effective bearing pressure ch.

f the jobs you're bidding on against the rmance records of the Buckeye 410 Bulletin No. 45 for complete details.

THERE'S A COST-CUTTING BUCKEYE TRENCHER FOR EVERY TRENCHING NEED

Built by Buckeye

Buckeye Traction Ditcher Co., Findlay, Ohio

"Repair work reduced to a minimum"

FROM NEW YORK

"...our business...construction and heavy lifting, pays off strictly on performance with no alibis accepted.

...we have been using Macmillan Ring-Free Motor Oil in all our equipment* for the last four years with uniformly satisfactory results.

...most of our equipment is in continuous operation, six days a week, in all kinds of weather. We notice the advantage of Macmillan Ring-Free especially in winter when our men are able to start the motors wth 2 or 3 turns of the crank, even on the coldest mornings.

...during the four years we have been using your oil, we have not had a single burned bearing or breakdown because of carbon on the rings...our repair work has been reduced to a minimum.

...in these days when repairs and replacements are difficult, Macmillan Ring-Free has stood by us like a good friend."

Excerpts of letter from CRANES, Inc. —one of a series of testimonial letters from all parts of the United States.

J. H. Snyder

Chief Mechanic, CRANES, Inc.,
Maspeth, Long Island

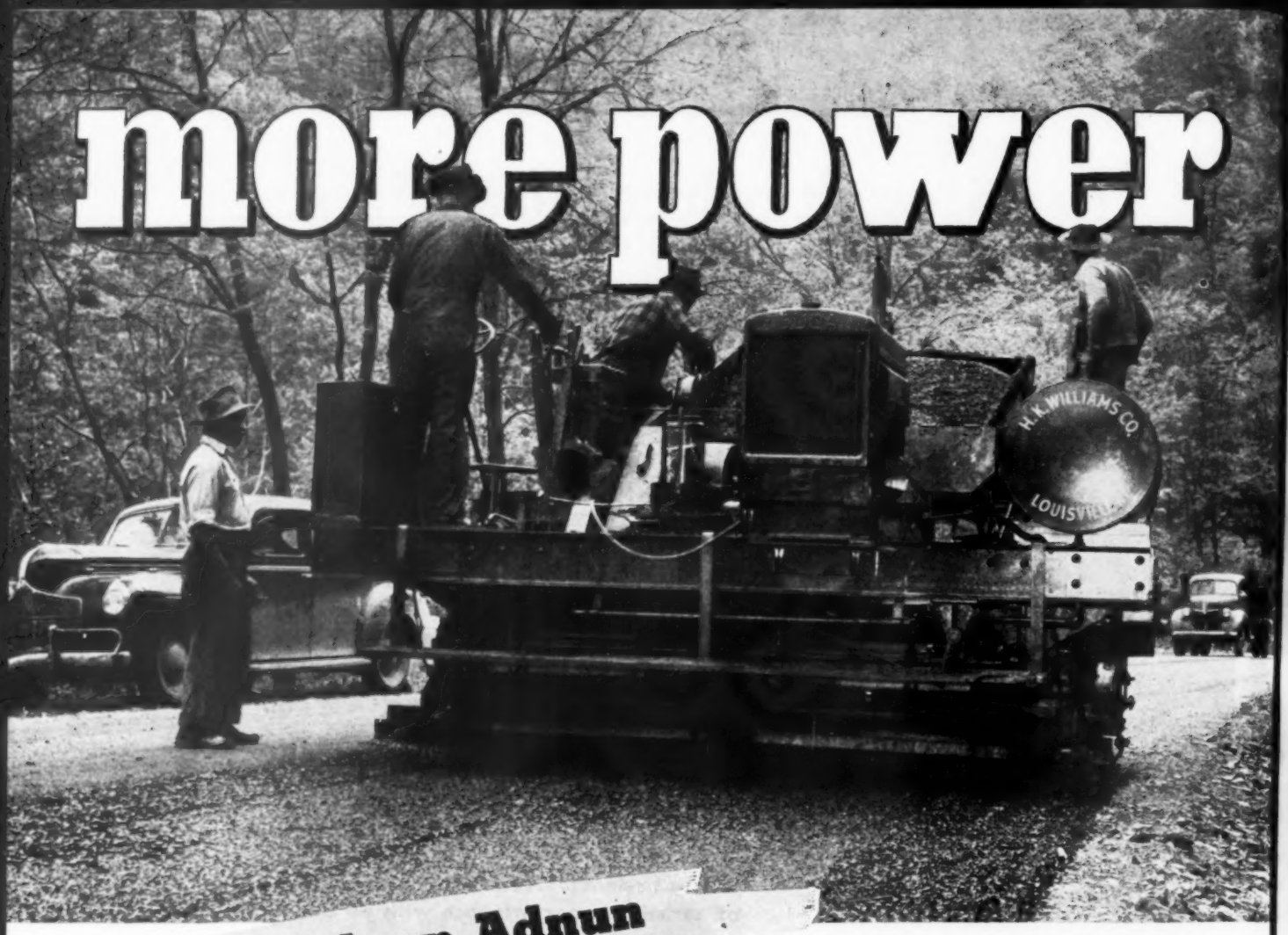
MACMILLAN RING-FREE MOTOR OIL

*Equipment operated by Cranes, Inc. includes: two 16-ton Link Belt truck cranes with 120 ft. booms, powered by six cylinder Waukesha motors; three P-H thirty-ton truck cranes powered by Waukesha motors mounted on four cylinder A-C Mack trucks, five to seven years old; two Schramm compressors, one and two tons, respectively, powered by Buda motors; four Hobart welders, powered by six cylinder Chrysler motors; two P-H welders, one mounted on a six year old Ford V-8, and one on a five year old Pontiac 8; a sixteen-ton double drum hoist which is fifteen years old; a 1942 three-and-a-half-ton Mack truck and a 1942 Chevrolet two-ton truck. *All on Macmillan Ring-Free, of course!*

MACMILLAN PETROLEUM CORPORATION

W. 50th Street, New York 20 • 624 S. Michigan Avenue, Chicago 5 • 530 W. Sixth Street, Los Angeles 14 • Copyright 1945, Macmillan Petroleum Corporation

more power



. . . with an Adnun Black Top Paver

Equipped with a new, more powerful gasoline engine, the Adnun black top paver is winning praise from experienced road-building men all over the country. Husky, economical, this 6-cylinder power plant makes huge, heavily loaded trucks *"pushovers"* for an Adnun. Operating smoothly and efficiently at all speeds, the Adnun handles loaded trucks with ease on any grade . . . while laying the mix according to specifications.

Adnun pavers *remain* in peak operating condition, because they are built for hard service. The rigid, cross-braced frame is more than adequate to absorb the shocks imposed by heavy trucks . . . bearings and shafts are kept in line. Power take-off is through heat-treated, alloy steel bevel gears, fully enclosed and running in oil, mounted on anti-friction bearings. Rear rollers are mounted in cast steel frames and the cutter bar is fully enclosed, can't be bent or warped.

For further details on these new, powerful pavers ask an Adnun owner, see your nearest Foote Distributor or write direct.

THE FOOTE COMPANY, INC.

1936 State Street · Nunda, N. Y.

The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers

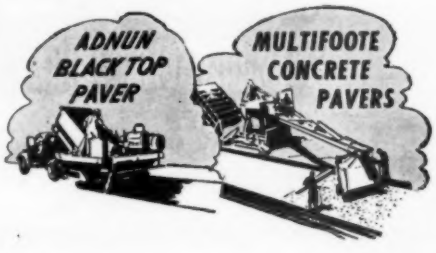
ARMY E NAVY

ADNUN

TRADE MARK REGISTERED

BLACK TOP PAVER

WITH CONTINUOUS COURSE CORRECTION



"SPRAY MASTER" SPRAYING ASPHALT ON AN AIR-PORT RUNWAY SOMEWHERE IN THE SOUTH PACIFIC.

When it comes to spraying Asphalt, Tar, Road Oils, or Emulsions, the "Spray Master" cuts the cost of operation.

The "Spray Master" is not an ordinary Pressure Distributor, but a designed spraying unit that incorporates years of research and actual road work under all conditions. Features found on the "Spray Master" are exclusive Littleford design and are offered as standard equipment.

"Spray Master" Distributors are made in Front or Rear Engine mountings with Standard or Circulating Spray Bars up to 24 feet in width.

Be ready for the Big Road Building Program, have a "Spray Master" Pressure Distributor ready to do the job.

A TYPICAL VIEW OF THE "SPRAY MASTER" AT WORK SPRAYING A HIGHWAY.

BLACK TOP ROAD MAINTENANCE EQUIPMENT
LB
SINCE - 1900

LITTLEFORD

LITTLEFORD BROS., INC.
454 E. Pearl St. Cincinnati 2, Ohio

HEIL Hi-Speed Cable Scrapers

dig *capacity* loads.. faster..easier..without voids or waste

Correct Bowl Design

The size and shape of the bowl and front gate, plus the top forward slope of the back sheet, permits excellent boiling action.

. . . conforms with natural boiling action

The dirt has a tendency to boil into a mound-like load. The Heil bowl *fits* the load—without extra digging time or spillage due to forcing dirt into empty pockets at the rear.

Power-steer short-radius turn

Even in heavy going and over rough construction roads, the Heil Hi-Speed Tractor steers with the ease of the conventional passenger car. An engine-driven hydraulic pump furnishes steering power controlled by the steering head. The wheel is merely the hydraulic control-valve lever for the power steer. In addition, it can be operated manually to provide ample steering control in case of failure of the power system. Powerful in action, simple and reliable, this exclusive Hydro-power steer saves time and cuts driver fatigue

R-53

Because of its scientifically designed bowl and correctly pitched cutting blade, the famous Heil Hi-Speed Cable Dozer digs bigger payloads easier and faster. The bowl design conforms with the natural boiling action, forcing dirt into the entire bowl area without voids or waste. In addition, the rapid raising and lowering of the cutting bit, made possible by the fulcrum-type lift, forces all loose soil into the bowl—saving many valuable minutes out of each working hour.

Push-loaded with a crawler tractor, this unit digs a heaped 15-yard load in 40 to 50 seconds and speeds away to the fill at speeds up to 20 m.p.h.—to help you move more yardage, faster and cheaper. For further details—

See your Heil Distributor

THE HEIL CO.

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✓ IMPROVED!
✓ SIMPLIFIED!
✓ STREAMLINED!

FLINK Self Feeding SPREADER

FLINK MODEL WD31 SPREADER
With new safety protective housing over spreader blades and sides.
Also available with Hydraulic Drive.

NO OTHER SPREADER HAS ALL THESE ADVANTAGES:

- Spreads all materials to 1"
- Spreads thick or thin as desired
- Attaches to truck as a tailgate
- Does not limit use of truck
- Clutch controlled from cab
- Starts spread with truck in motion
- Stops spread with truck in motion
- Self feeding—no helper on back
- Spreads forward or backward
- Half or full width of street
- Reduces number trucks required
- Positive uniform spread
- Fits any dump truck
- Thousands in use

USE FEWER MEN—TRUCKS—TIME

New simplified construction, installation and maintenance, new ease of operation . . . but basically the same practical, economical, efficient Flink spreader that has proved itself in a thousand tough road construction and maintenance jobs . . . in ice control and dust control all over America. Write for complete information.

THE FLINK COMPANY

The men who plan now will get **$300,000,000**

$150,000,000 a year for the first three post-war years, will be spent on America's 2,400,000 miles of principal secondary and feeder roads, under the Federal-Aid Highway Act of 1944. States are expected to match these appropriations dollar-for-dollar, making the total $300,000,000 a year. 6,000,000 farms are served by these roads.

Charles M. Upham, engineer-director of the American Road Builders' Association, says that some states have made excellent progress in their road-building plans, but that the plans of others are still in the dream stage. Mr. Upham urges immediate action so that the highway improvement program may be carried forward without delay.

For your highways, Koppers Tarmac is suitable for every type of construction . . . surface treatments, mulch treatments, mixes, pre-mixes, etc. Tarmac is well adapted for mixing with local aggregate. Roads can be built quickly with Tarmac and opened to traffic immediately after construction. Where necessary, they can be built while traffic uses the roads.

Use KOPPERS **Tarmac**
for economy, durability,
low maintenance,
skid resistance

KOPPERS COMPANY, INC.
Tar and Chemical Division, Pittsburgh 19, Pa.

Material, loaded on wagons by an International TD-14, is rushed to construction sites by a fleet of International ID-9 Diesel Wheel Tractors.

Get INTERNATIONAL Power...

for Peak Performance!

• International TracTracTors for those tough, grubby jobs that require the power and sure-footed traction of a crawler. International Wheel Tractors for fast, heavy hauls. That's the right combination to reduce man-hours, speed up the work cycle and cut costs in material handling and construction.

Peak performance from Internationals is assured by their advanced design. For example: more of the engine horsepower is delivered to drawbar and power shaft because all working parts are positively and permanently aligned, and ball bearings are used generously in transmissions and drive shaft assemblies.

International's easy starting, *full* Diesel or carburetor-type engines power these tractors. They are designed and built for continuous, heavy-duty service—and operate smoothly, with plenty of reserve power to pull out of the tight spots.

On the basis of performance, Internationals have hung up a record of leadership in the industrial field. Any International Industrial Power Distributor can substantiate this with performance charts and other data which will help you choose the power and equipment for the jobs you're bidding on.

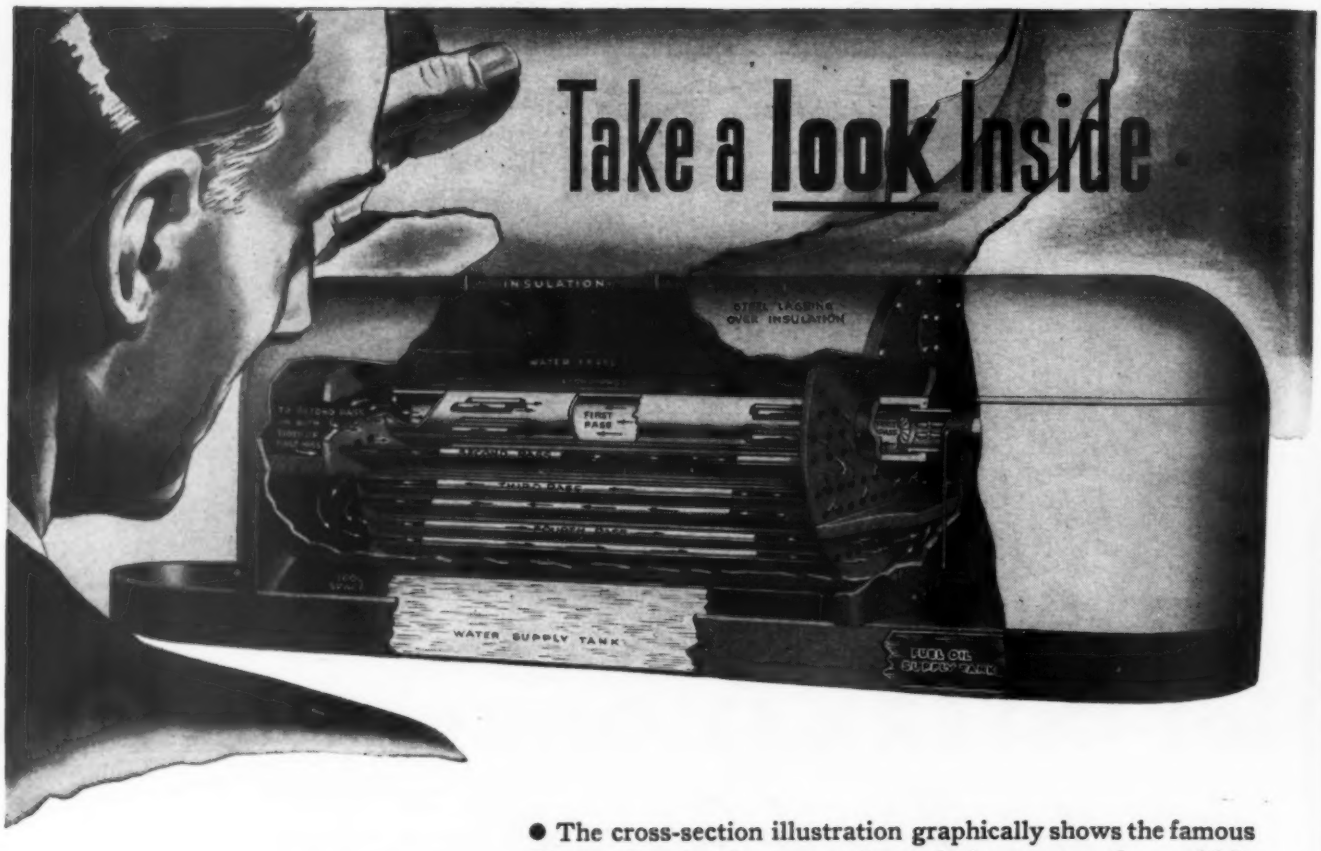
Dependable after-sale service is provided all owners of Internationals by distributors and dealer organizations that span the continent and circle the globe. Factory replacement parts and equipment built for use with International Tractors and Power Units are available through these organizations. This assures maximum value and long term benefits for owners and operators everywhere.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue **Chicago 1, Illinois**

INTERNATIONAL **Industrial Power**



••to see why you get hot, dry steam faster with less fuel and water

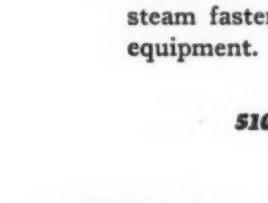
● The cross-section illustration graphically shows the famous Cleaver-Brooks four-pass down-draft construction which, with integral oil-burner, accounts for the remarkable efficiency of Cleaver-Brooks steam generating equipment.

This construction doubles the lineal gas travel, compared to ordinary two-pass boilers,—the result is unmatched high heat transfer and efficiency.

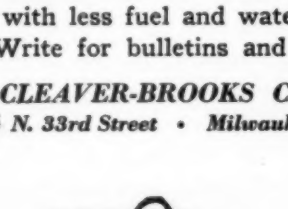
No other equipment has this original and exclusive four-pass down-draft construction—plus the perfected positive dry coil method of condensate return—that's why you get hot, dry steam faster with less fuel and water with Cleaver-Brooks equipment. Write for bulletins and complete information.

CLEAVER-BROOKS COMPANY
***5106** N. 33rd Street • Milwaukee 9, Wisconsin*

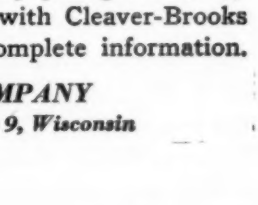
Automatic Steam Plants
Completely self contained; highly efficient; require only simple piping connections to place in operation. Fully automatic fuel-oil burner; condensate recovery and feed water pumping system; no stack needed, sizes from 20 to 500 h.p.; pressures 15 to 200 lbs.



Hot Water Boosters
Oil-fired; fully automatic or manual operation; no licensed engineer needed; two capacity sizes: 3000 gals. storage tank for 1600 gals. of water heated 150° F. per hour; 1500 gals. storage tank for 800 gals. of water heated 150° F. per hour.



Portable Pumping Boosters
Heats bituminous material by direct firing in one operation, loading directly to distributor, relay truck or returning to tank car. Two sizes, truck mounting or 4-wheel trailer.

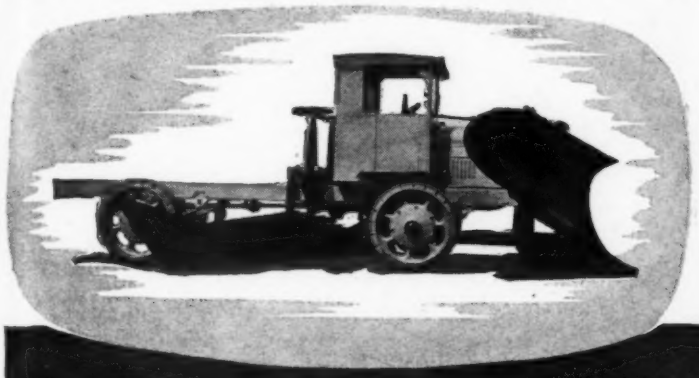


Portable Tank-Car Heaters
Available in 2 and 3 tank-car sizes. Oil-fired with exclusive four-pass flue travel; dry-coil steam condensate return under pressure — no water or heat loss. Provides a portable source of steam wherever needed.

Cleaver-Brooks

Pioneers and Originators of ★TANK CAR HEATERS ★BITUMINOUS BOOSTERS ★AUTOMATIC STEAM-PLANTS

WALTER SNOW FIGHTERS

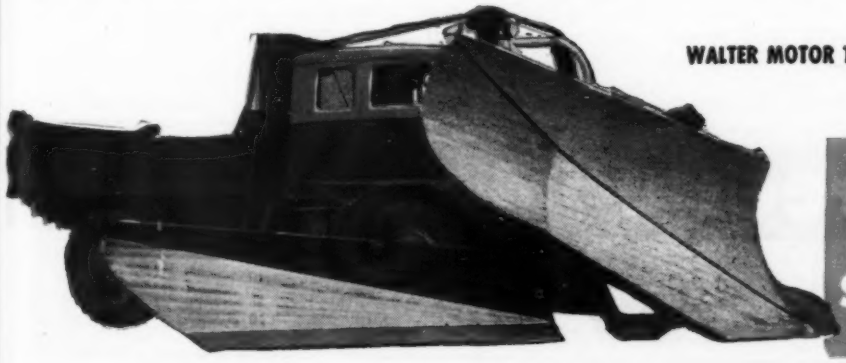


Pioneered Modern Snow Removal 25 Years Ago!

When the first Walter Snow Fighter introduced 4-Point Positive Drive back in 1921, it revolutionized snow removal. Walter engineers designed this advanced drive, featuring Automatic Locking Differentials, to provide super-traction that eliminates slipping, stalling and wheel-spinning, and fully utilizes the tremendous motor power.

Today's Walter Snow Fighters . . . much bigger, more powerful, more rugged . . . are built around the vastly improved 4-Point Positive Drive and greatly refined locking differentials. The modern 250 h.p. Walter Snow Fighter, for example, removes a greater volume of snow per hour than any other equipment. It clears a 28 ft. width in *one* run, a two-lane road in *one* round-trip—at speeds as high as 30 m.p.h. Removes snow before it packs and freezes into dangerous ruts. Speedily clears road-blocking drifts. Widens out at a fast clip.

Get the full engineering story behind this performance. Write today for detailed literature.



WALTER MOTOR TRUCK CO. 1001-19 Irving Ave., Ridgewood 27, L. I., N. Y.

WALTER SNOW FIGHTERS

HOW A B-G SNOW LOADER

CLEARS STREETS SPEEDILY AND CHEAPLY

This Barber-Greene machine doesn't just push snow from one place to another—it *removes* the snow from your streets *completely*. And, you can clear thoroughfares quicker and more economically with the B-G Snow Loader than any other way.

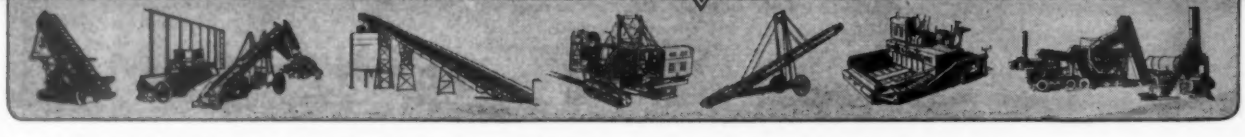
Actually, a B-G Snow Loader often pays for itself in a single operation—*in truck time savings alone*. In addition, it will replace scores of hand shovelers by loading up to 20 cubic yards of windrowed snow a minute, hour after hour.

There's no need to pamper a B-G Snow Loader. Full crawler mounting makes it sure-footed on the slipperiest streets. Notched spirals eat through icy chunks and packed banks easily. An Automatic Overload Release protects the loading mechanism when hidden obstacles are encountered.

B-G Snow Loaders have many other advantages too: high discharge for high-sided trucks, variable crowding speed, floating boom, tank-type chassis, low traveling clearance, easy operation. Best of all, by merely replacing the boom, it can be converted into a B-G Bucket Loader for year round utility in material handling jobs. Barber-Greene Company, Aurora, Illinois.

45-13

Barber-Greene B G *Constant Flow Equipment*

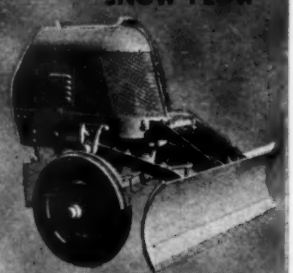


Versatile's THE WORD FOR THE

HUBER MAINTAINER

V TYPE
SNOW PLOW

Here's an all-purpose machine which makes short work of year 'round street, highway and airport maintenance jobs . . . jobs so varied it's hard to believe a single machine could handle them successfully. Equipped with a 9' scraper blade for light sub-grading, the Huber Maintainer can be converted speedily via practical attachments into a bulldozer, snow plow, mower, sweeper, lift loader or patch roller . . . has plenty of power at the drawbar for hauling, too. To get better acquainted with this one-man "maintenance crew," write today for a Huber Maintainer specification sheet.



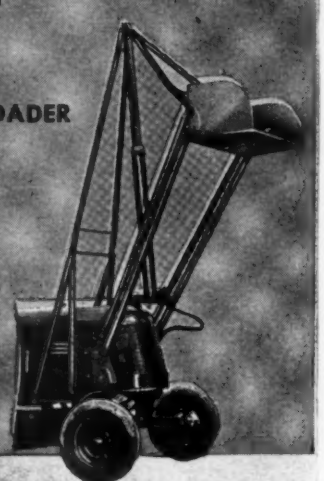
BULLDOZER

PATCH ROLLER

ROTARY
BROOM

CAB

MOWER



LIFT LOADER

THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER

3 WHEEL & TANDEM ROLLERS

YEAR 'ROUND MAINTAINER

Champ of the Road Gang

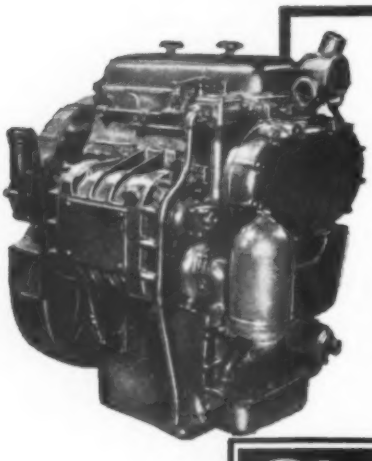
GENERAL MOTORS Diesel-powered road machinery is already hard at work helping rebuild the highways of America.

You will find these rugged two-cycle Diesels powering rock plant equipment such as rock crushers, clam shells, draglines and screens. They also power vehicles that haul the dirt and stone, and motor graders that level off the job.

There are many good reasons why General Motors Series 71 Diesel engines are champs of the road gang. First, two-cycle principle simplifies design and produces far more horsepower than other engines of the same size and weight. Then interchangeability of parts provides maximum availability—keeps them on the job.

This all means more work done and less time out for service.

Until recently, all General Motors Diesels "went to war." Now they are again available and road builders are again availing themselves of this low-cost, dependable, money-making power.



FEATURES OF THE GM "71" DIESEL

- ★ Low size and weight per horsepower
- ★ Uniflow scavenging—clean burning
- ★ Unit injectors—no high-pressure piping
- ★ 2-cycle, smoother operation
- ★ Good performance-power to pull at high altitudes
- ★ Quick starting under all conditions
- ★ Easy accessibility of wearing parts

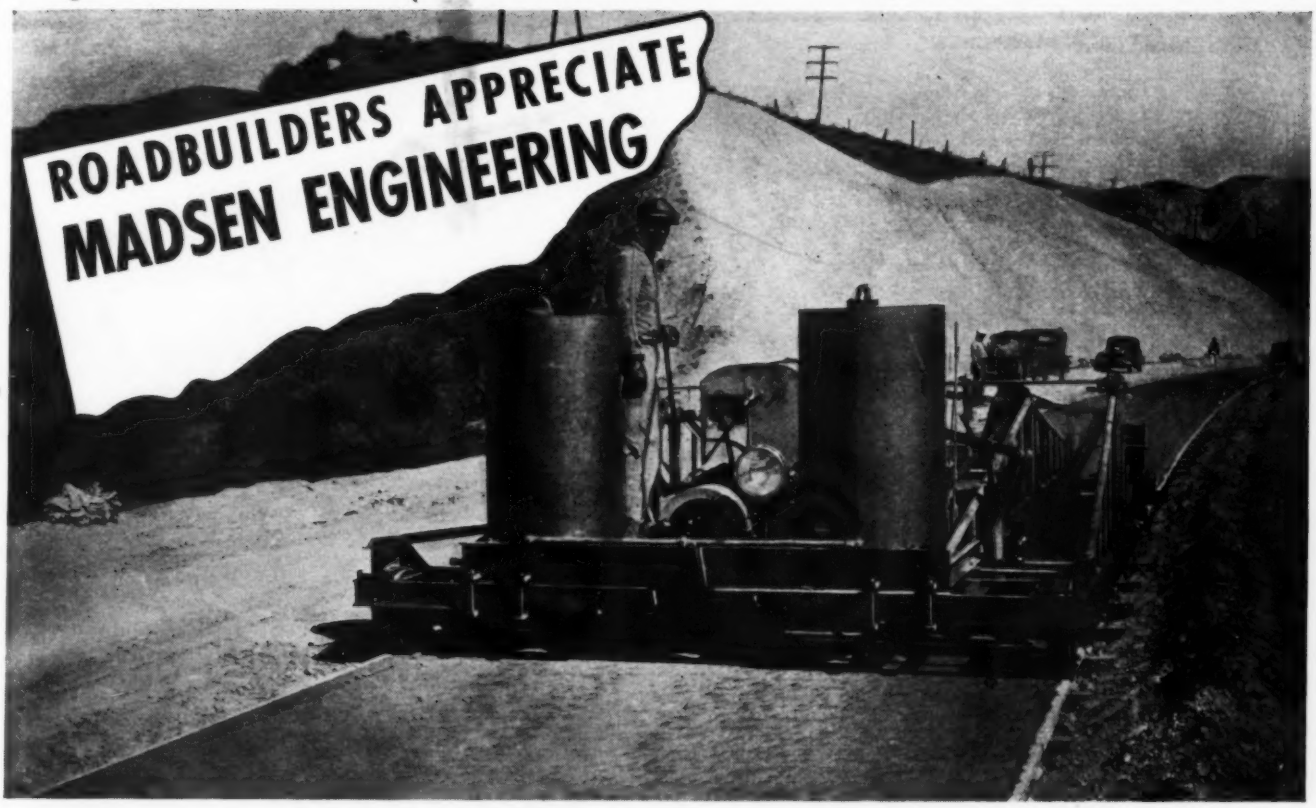
Maximum parts interchangeability

KEEP AMERICA STRONG BUY VICTORY BONDS

GM
GENERAL MOTORS
DIESEL POWER

SINGLE ENGINES . . Up to 200 H.P.
MULTIPLE UNITS . . Up to 800 H.P.

• • DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.



JOHNSON *Mechanical* FLOAT FINISHER

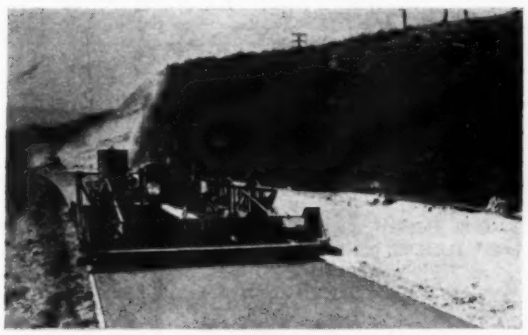
...BUILT BY MADSEN

Before you order mechanical concrete finishing equipment, you will want to know, among other things, what the equipment will do, what it has done and how it works. Here are the answers, briefly given, to these fundamental questions as they relate to the Madsen-built Johnson Float Finisher.

WHAT IT DOES: The Johnson Float Finisher reduces concrete finishing costs, eliminates the bottleneck of hand finishing and steps up the production of the entire paving project. It reduces the hand finishing crew to two or three men for a complete job.

WHAT IT HAS DONE: Reliable contractors, the country over, consistently report averages better than 2,000 lineal feet per 8-hour day on difficult paving projects. Much of the thanks for record breaking speed and dependably smoother highways goes to Johnson Float Finishers.

HOW IT WORKS: A full width roller compresses the



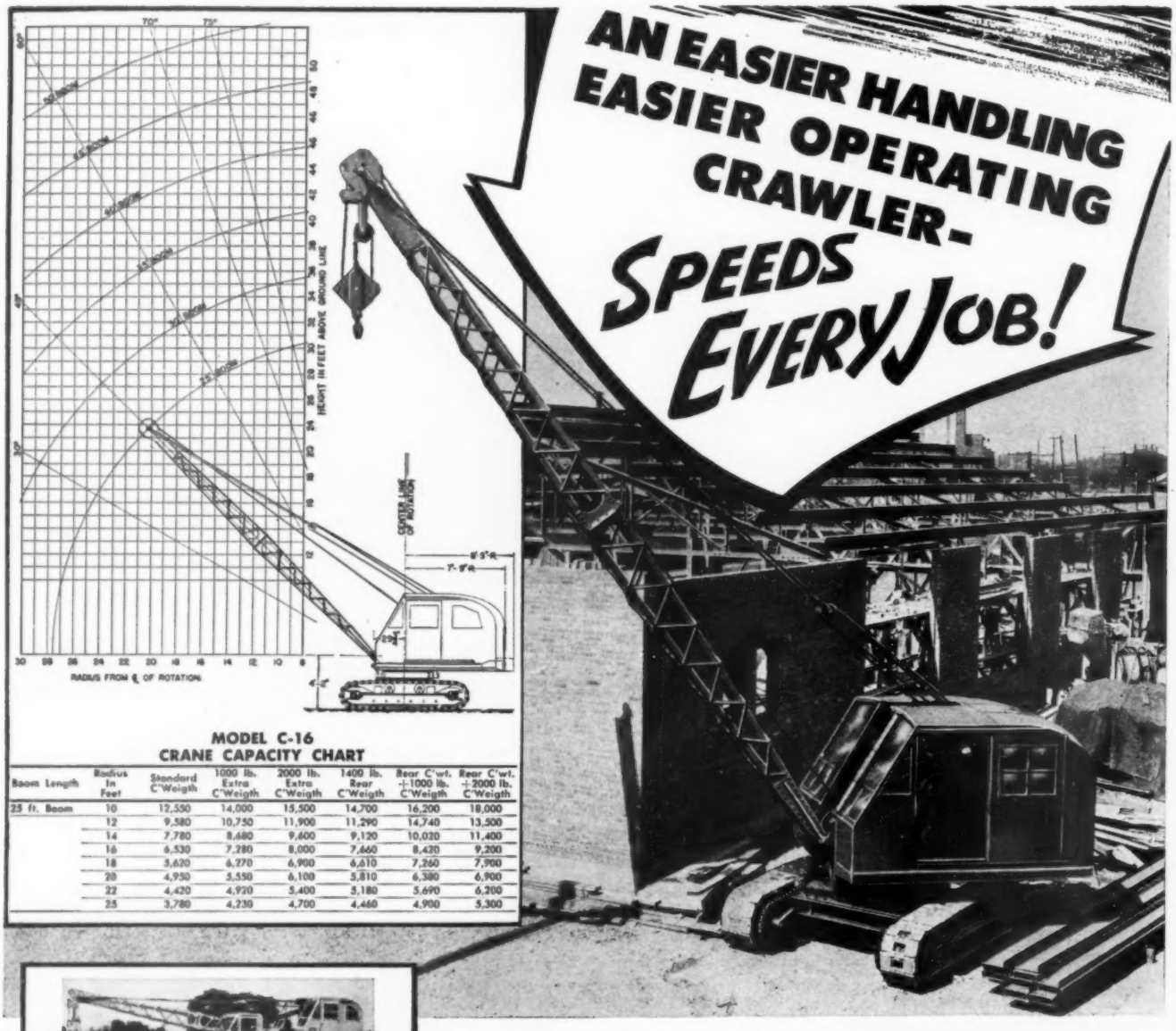
aggregate and brings the liquid mortar to the surface. Adjustable floats spread, fill and smooth the entire surface of the concrete. The Johnson Float Finishers' process eliminates unevenness and severe slump; it produces a uniform surface that gives a final finish ready for edging and jointing.

MADSEN IRON WORKS

HUNTINGTON PARK, CALIFORNIA

Write for Catalog

MADSEN ASPHALT PLANTS • ROAD PUGS • CEMENT FINISHERS • BATCHERS • COMPACTORS



MODEL C-16
CRANE CAPACITY CHART

Boom Length	Radius In Feet	Standard C'Weigth	1000 lb. Extra C'Weigth	2000 lb. Extra C'Weigth	1400 lb. Rear C'Weigth	Rear C'wt. +1000 lb. C'Weigth	Rear C'wt. +2000 lb. C'Weigth
25 ft. Boom	10	12,550	14,000	15,500	14,700	16,200	18,000
	12	9,580	10,750	11,900	11,290	14,740	13,500
	14	7,780	8,680	9,600	9,120	10,020	11,400
	16	6,530	7,280	8,000	7,660	8,420	9,200
	18	5,620	6,270	6,900	6,610	7,260	7,900
	20	4,950	5,550	6,100	5,810	6,380	6,900
	22	4,420	4,920	5,400	5,180	5,690	6,200
	25	3,780	4,230	4,700	4,460	4,900	5,300

Model TLDT-20 Truck-type Crane, 12-ton capacity

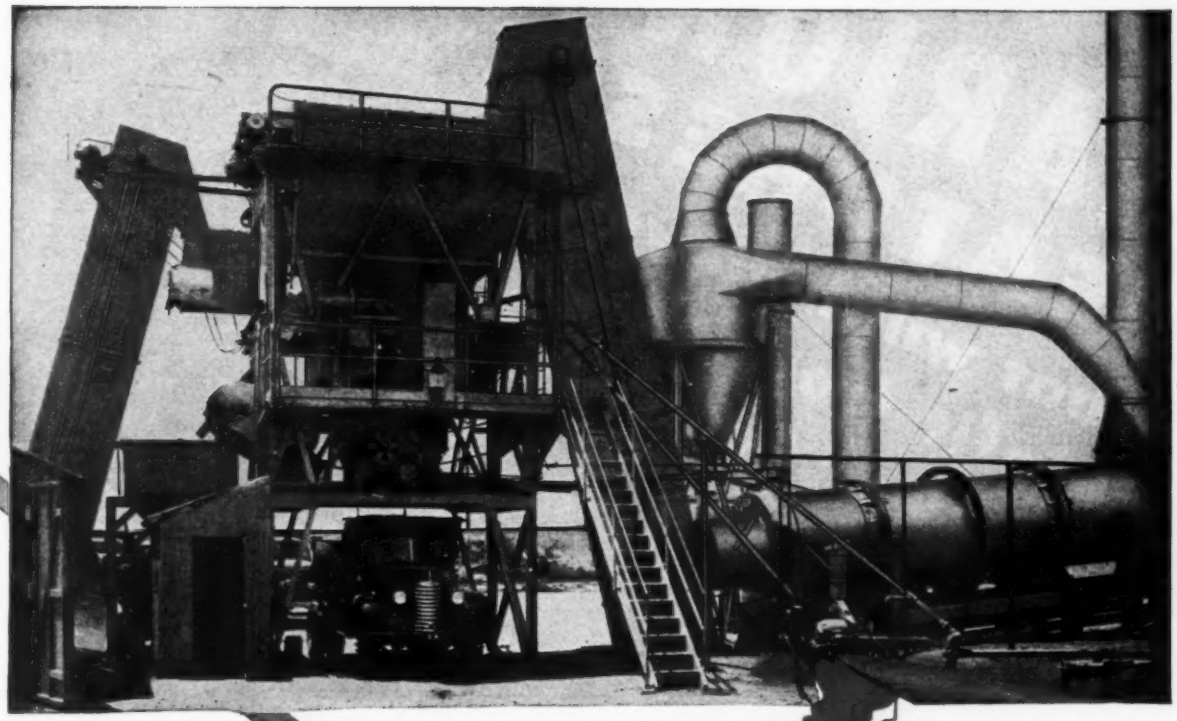
Model T-6-K Truck-type ⅜-yard Shovel, 6 to 8 ton Crane. Completely convertible.

MODEL C-16 MICHIGAN
½-YARD CRAWLER-CRANE

Faster production, greater operating ease, lower costs on all types of crane work—that's what owners and operators get with this combination of job-proven MICHIGAN-built crawler unit plus the air-controlled mechanism of the world-famous Michigan Truck-Type Shovel-Crane . . .

The complete story about Model C-16's *tractor steering, simultaneous travel-hoist-swing-crowd, quick convertibility, finger-tip air-controlled clutches* — and many other time-saving, profit-earning MICHIGAN features — is given in Bulletin RS-105. Write today.

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN



Ready for the Nations Highways

TOUGH WAR EXPERIENCE CONDITIONS EQUIPMENT FOR THE PEACE

Before the war, Standard Steel's Paving Plants made outstanding production records throughout the country in bituminous road construction. With war, this equipment has played and is playing an important role in the building of many, many airports, both at home and abroad. Performance under the toughest kind of operating conditions has proved the efficiency of this equipment. Not satisfied, however, Standard Steel engineers have plans, already past the drawing board stage, for increasing even more the effectiveness of these great paving plants. It will behoove contractors to keep an eye out for Standard Steel's post-war line of road machinery.

OTHER STANDARD ROAD CONSTRUCTION EQUIPMENT: ROLLERS, SUBGRADERS, BATCHING PLANTS, DRYERS, FINISHERS, BROOMS

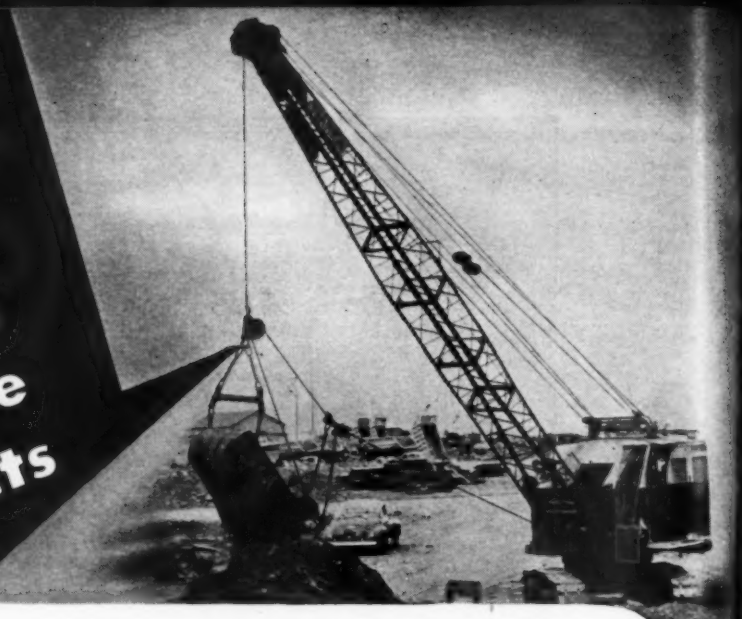
STANDARD

STEEL CORPORATION

General Offices and Plant 5001 South Boyle Avenue
Los Angeles 11, California

MARION FEATURES

that will help you Profit from those Postwar Contracts



SPEED — to insure top yardage.

POWER — to whip the toughest digging.

CONTROL — to let your operator get out those extra pay loads.

STRENGTH — to stand up and take it for years.

STABILITY — to handle full rated loads under the most severe conditions.

MANEUVERABILITY — to get everywhere on the job.

They all add up to

RELIABILITY

You can Bank on a MARION

There is a MARION of the right size for your job!

WHAT IS YOUR MATERIAL HANDLING PROBLEM?

THE MARION STEAM SHOVEL COMPANY

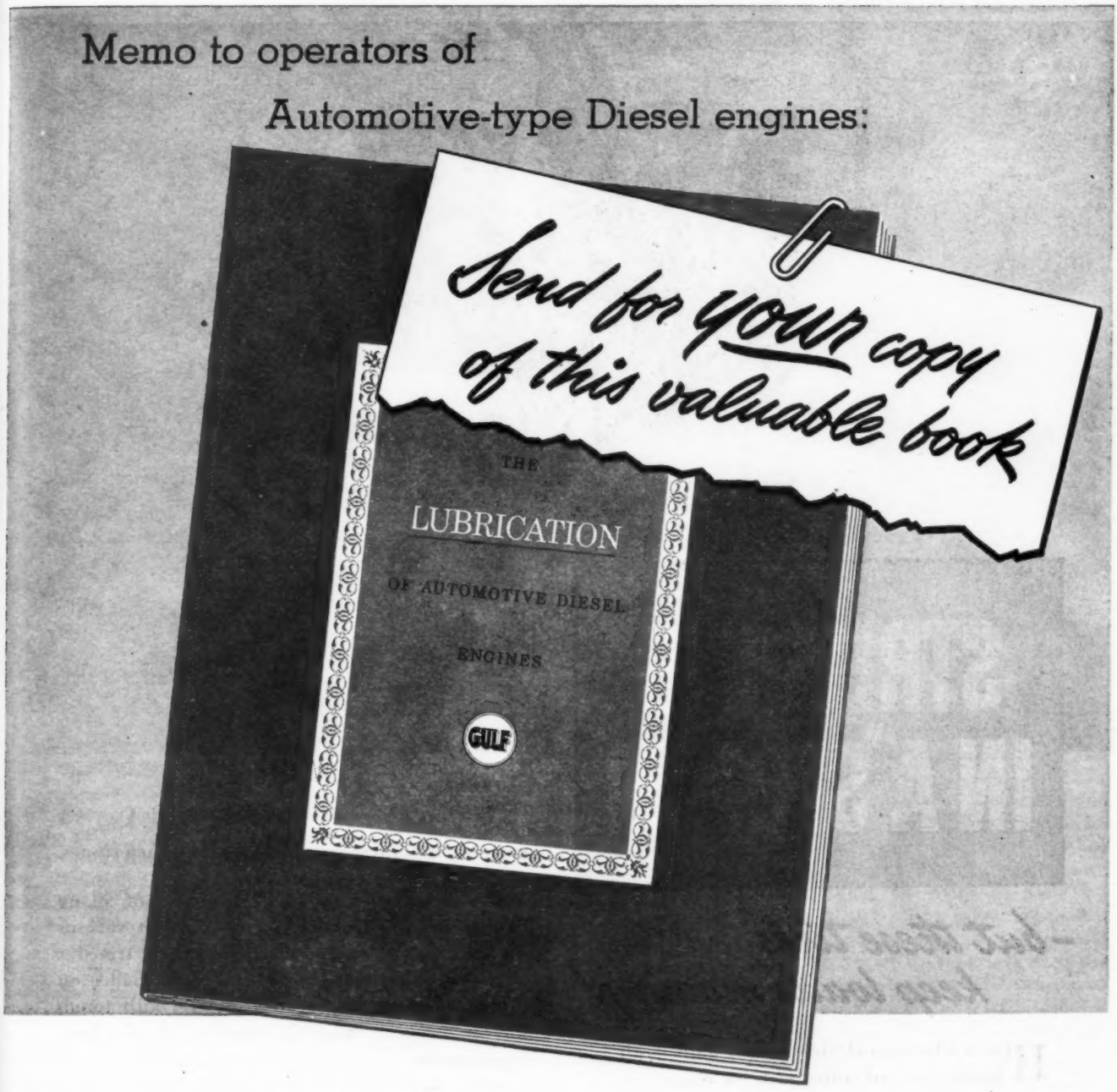
MARION, OHIO

Offices and Warehouses in all Principal Cities

3/4 cubic yard to 40 cubic yard

Memo to operators of

Automotive-type Diesel engines:



48 pages of useful information!

READ the new Gulf book "The Lubrication of Automotive Diesel Engines"! Here are some of the important subjects covered in this instructive book: Selection and care of lubricating oil, functions of the lubricating oil, engine tests, Diesel fuels and their combustion—and many others.

It tells how to break in new rings faster, when to replace pistons, the nature of light-load and low-temperature engine troubles, and answers many other important operating questions.

To get your copy of this useful book, just fill in the attached coupon and mail it to the address shown below.

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Please send me, without obligation, a copy of the new Gulf Book, "The Lubrication of Automotive Diesel Engines."

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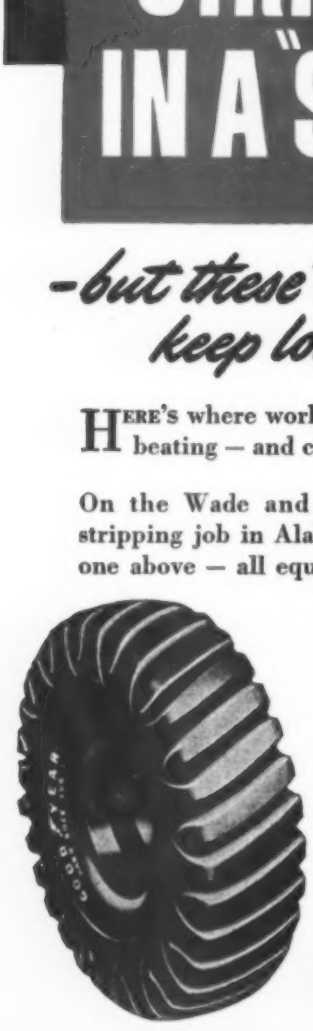
STRIPPING IN A "STREAM"

—but these tires keep loads moving!

HERE'S where work-tires take a daily bath and beating — and come back for more.

On the Wade and Richey Company's coal-stripping job in Alabama, seven trucks like the one above — all equipped with Goodyear Hard Rock Lug tires — haul away the coal. But a perverse creek nearby puts much of the area under several feet of water. So loads must be pulled through sticky mud and slime — often over submerged and murderous rocks, shale, sharp stones.



Yet these Goodyears — all veterans of many months of rough and rugged service at various ore and quarry operations before their transfer here — are delivering top-notch performance on this tire-killing job because they're built tough for tough going, have the stamina to take long punishment.

The other Goodyear off-the-road tires, too, are job-proved, high-hour performers — the great Sure-Grip with *open center* tread for drive wheels where traction counts most, and the time-proved All-Weather Earth Mover for drawn vehicles where easy rolling is a must.

And because these tough work tires consistently deliver lower costs-per-ton-mile, more and more contractors now buy Goodyears for their units. Chances are you will, too, once you get the story from men now using them.

Sure-Grip, All-Weather—T.M.'s The Goodyear T. & R. Co.

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

ROADS AND STREETS

October, 1945, Vol. 88, No. 10

Knoxville Resurfaces With Topeka Mix

How worn asphalt streets in this booming war munitions center were restored with 31,000 tons of plant-mix and 400,000 sq. yd. of mat treatment in 1945. Old stone streets also scarified, tarred and sealed

By B. C. BARKER
Director of Public Service, and

L. C. BAILEY
City Engineer, Knoxville, Tenn.

UNTIL the atomic bomb was revealed, the citizens and officials of Knoxville, Tennessee, weren't encouraged to tell how much their city had grown during the war years. But now it can be told. Knoxville gained 30% from 1941 to 1944 (presently 200,000) and its estimated trading-area population expanded to nearly half a million due to the proximity of the huge Clinton Engineering Works and other war activities utilizing TVA's plentiful power resources.

Naturally the street traffic load also climbed, and in so doing it accentuated the fact that full street maintenance had not been budgeted for since the depression years. Particularly during the past six years due to war restrictions and lack of funds, street repairs had been postponed until a city-wide deterioration of surface was in evidence. Many miles of old sheet asphalt and asphaltic concrete surfaces were cracking or opening up badly although most surfaces were still structurally sound though rough.

An extensive resurfacing program was determined upon, and $326,000 set aside early in 1945 for this work (later increased to $400,000). As a basis for selecting projects, all streets needing repairs were visited in a survey in which individual streets were listed under four classifications of need. From this survey a map was prepared and a list of projects compiled.

Two general types of repairs were adopted. Severely deteriorated streets were patched and given a two-course resurfacing of hot bituminous plant-mix, the surface course being Topeka mix. Less worn sections were merely given a mat treatment.

The plant-mix resurfacing in general was placed as follows:

1. Of course the old pavement was patched and swept clean just prior to application.

2. The binder or leveling course was placed with mechanical spreaders and rolled to a maximum center thickness of about 1½ in. This course usually was feathering out before reaching the curb, in order to minimize changes in gutter elevation. A paint coat binder was first placed on the old pavement in some instances, this binder being considered specially important over concrete gutters to be covered and over the areas along curbs where the plant-mix binder course material feathered out or was omitted.

3. The Topeka mix surface course of one inch compacted thickness was spread mechanically and rolled. No special provisions were followed except that rolling was kept to a minimum along curbs and considerable hand tamping was resorted to here. A motor grader helped the hand

One of Knoxville's resurfaced streets

(Left) Note how binder course (on near side of street) was feathered out before reaching the curb. Paint coat previously applied is in evidence in gutter. Surface course under construction on far side. (Right) Roller passes were kept to a minimum near curbs

rakers speed up spreading on some short sections where it wasn't expedient to bring in a spreader.

As is often the case in any street resurfacing work which raises the general surface elevation, "trimmings" rather than the general procedure required the greatest attention. One problem was the eradication of humps which had grown at expansion joints in the old concrete base or covered-over pavement. The existing asphaltic cover was entirely cut away for a distance of 6 to 10 in. back on each side of such joints, the joint cleaned and resealed (or eliminated), and new hot-mix placed and tamped. This item cost the city about 80c per lin. ft.

At catch basin inlets the resurfacing was feathered down to the original level in a distance of 18 in. This of course required careful hand tamping.

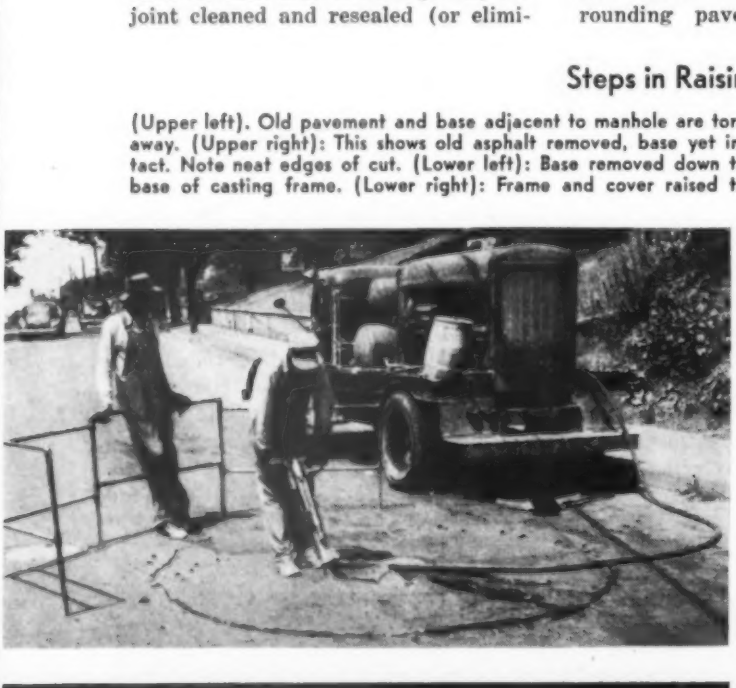
In the case of manhole and utility castings another policy was followed, namely, that of raising the elevation of the covers to conform to the new pavement surface. As illustrated in the accompanying photos, this operation called for digging out the surrounding pavement and base, rebuilding or raising the height of the concrete manhole cover support, placing fresh concrete base flush with the existing street surface, and then proceeding with the resurface.

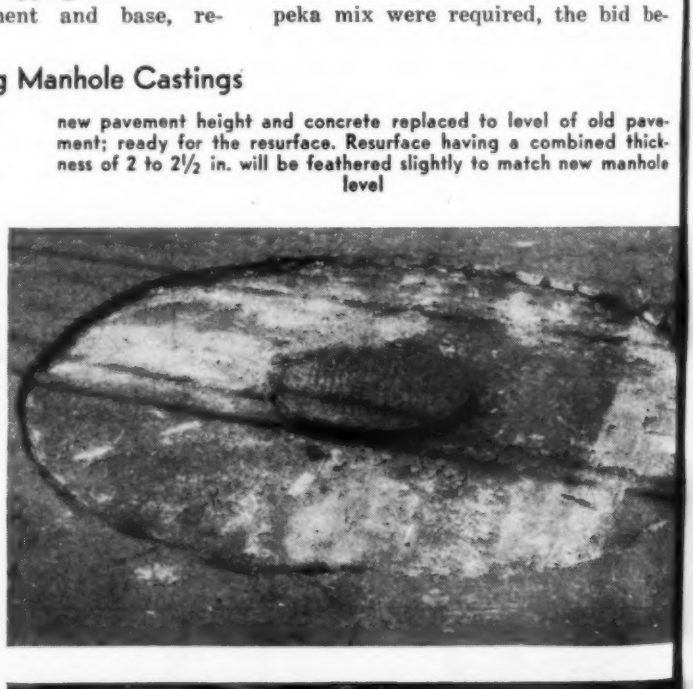
Old abandoned street car tracks where involved were covered over and rails left in place.

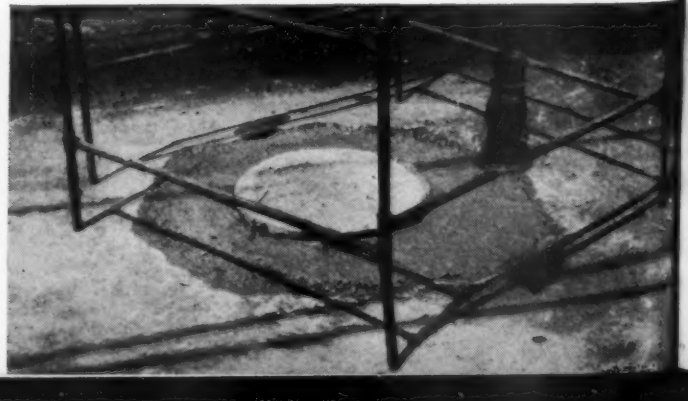
Altogether the equivalent of 30 miles of 27-ft. streets were resurfaced by this method during the past year. Contractors were paid by the ton of materials, rather than square yard. About 10,000 tons of asphaltic binder mix and 21,000 tons of Topeka mix were required, the bid be-

Steps in Raising Manhole Castings

(Upper left). Old pavement and base adjacent to manhole are torn away. (Upper right): This shows old asphalt removed, base yet intact. Note neat edges of cut. (Lower left): Base removed down to base of casting frame. (Lower right): Frame and cover raised to new pavement height and concrete replaced to level of old pavement; ready for the resurface. Resurface having a combined thickness of 2 to 2½ in. will be feathered slightly to match new manhole level







Scenes at modern asphalt plant of Knoxville Const. Co.

ing $6.95 and $7.23 per ton in place, respectively. The Topeka mix is noteworthy in that its specifications follow the widely prevailing trend towar softer asphalts; 85-100 pen. asphalt was used instead of the 50-60 grade formerly specified.

Aggregate and Mix Specs

Binder course aggregates and mineral filler were specified to be combined in such a manner as to provide the follow composition, by weight:

52-72% pass 1-in., ret. on No. 4
8-20% pass No. 4, ret. on No. 10
15-35% pass No. 10

Within this leeway careful study was made to secure the best job mix formula, with the ready co-operation of the contractor.

The Topeka mix, for readers who haven't had occasion to use this type constantly, followed the usual wide specifications:

Stone: 0% retained on ⅝-in. screen; 0-10% between ⅝-½-in.; 85-100% bet. ½-in. and No. 4.
Fine Aggregate: 100% pass. No. 4; 0-20% bet. Nos. 4-10; 14-50% bet. 10-40; 22-65% bet. 40-80; 15-40% bet. 80-200; 0-6% pass. 200 screen.
Mineral Filler: 100% pass. No. 30; 85-100% pass. 100; 65-100% pass. 200.
Combined: 20-45% bet. ⅜ and No. 10; 8-30% bet. 10-40; 11-36%, 40-80; 12-25%, 80-200; 5-10% pass. 200 screen; 7-8% bitumen.

Mat Coat Cost 12c Per Sq. Yd.

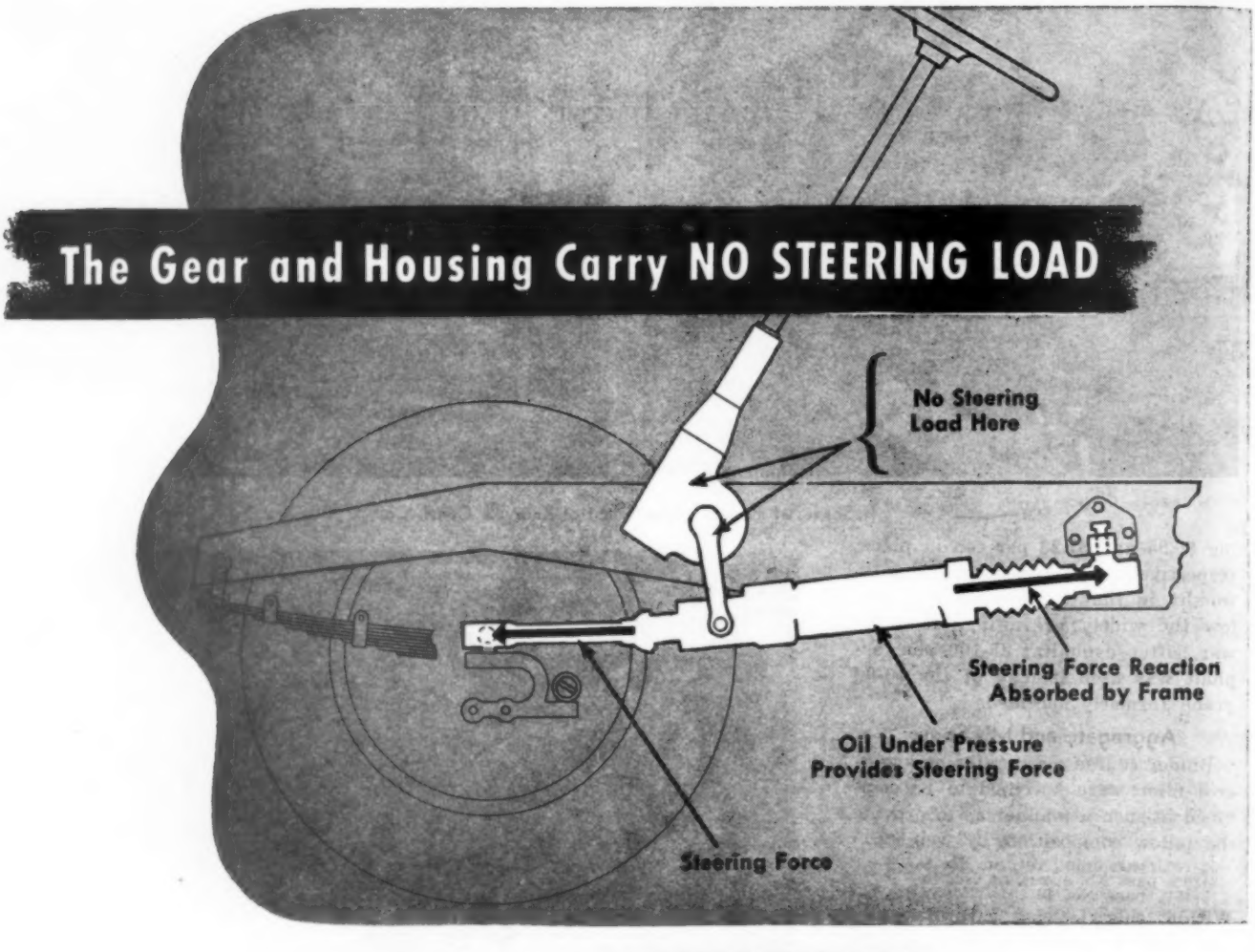
The bituminous mat treatment used on less worn streets consisted of the usual application of 0.3 gal. of straight AC (pen. 150-200) at 375° F., followed by 30 to 40 lb. per sq. yd. of ⅜-in. chips and rolled. The asphalt was bid at 12c per gal. and the aggregate cover at $3.50 per ton, the cost of this work in place averaging around 12c per sq. yd. About 30 miles of streets were placed in the program or are in the process of being completed.

Also on the Knoxville program was the reshaping and surface treatment of old stone streets, mostly in outlying areas. These were scarified, reshaped with blades, rolled, shot with RT3 or RT4 tar (0.5 to 1.0 gal. per sq. yd.) and covered, then given 0.5 gal. of RS1 emulsion or RT8 and ⅜-in. chips. About 16 miles of this type of work will be completed by December, 1945.

Placing Topeka mix surface course

The foregoing hot-mix and hot asphalt work was let to contract, the Knoxville Construction Co. of Knoxville having the contract. This firm's modern plant built in 1944 delivered 400 tons or more per day during the season. Construction Materials Laboratory designed and controlled the mix.

(Left): City Engineer L. C. Bailey and public service director B. C. Barker on inspection of Knoxville work. (Right) A bulging joint in process of correction before resurfacing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No Steering Load Here
Steering Force Reaction Absorbed by Frame
Oil Under Pressure Provides Steering Force
Steering Force

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There are many other advantages of effortless Vickers Hydraulic Power Steering. Ask for Bulletin 44-30 which contains complete information.

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Editorial

Contractor Labor Costs, the $64 Question

RECENTLY Governor Laney of Arkansas announced that he favored postponement of all further road bids until "prices come back to normal." The statement was made at the time of rejection of all bids on a considerable volume of highway work.

This is just one of many instances lately in which highway and other construction bids have been either thrown out or accepted with great reluctance because of continued high prices. Highway officials in other states are considerably alarmed, as reported elsewhere in this issue. Another instance was the rejection of bids on Merriman Dam by the New York Board of Water Supply; the lowest bid was some 30% higher than bids taken in 1939, and individual items were much higher. The 5,600,000 cu. yd. of rolled embankment for example was bid variously at $0.93, $1.15 and $1.30 by the three lowest firms, as against $0.48 low bid previously.

Contractors bidding this fall and winter on 1946 work naturally are faced with many uncertainties, but the big overshadowing question is: labor. And the crux of the labor problem is of course unionization and what the general attitude of workers will be as the reconversion period shakes itself down.

One of the contractors who has been giving serious thought to this matter is D. O. White, of White Consolidated, Inc., Chicago. Mr. White, who is president of the Illinois Road Builders' Association, makes the following points:

"We know we will continue to have extremely high labor rates.

"What we don't know is the availability of skilled help such as operating engineers, carpenters, concrete finishers and steel setters. We have reason to believe that these fellows will be mighty scarce in 1946 and 1947. Unions in these crafts greatly expanded on defense plant, shipyard and other war work, but not in manpower skilled in handling paving, grading and bridge building equipment. Few apprentices have been taken in during the war years. This puts skilled road construction workers in the saddle as to scale, hours and other terms of employment.

"Chief point of concern is the additional labor cost of guaranteeing a weekly minimum wage regardless of weather. Contractors in unionized areas may be required increasingly to make such a guarantee. Material producers, too, will be affected."

Operating engineers in certain metropolitan regions already have a 4-day weekly guarantee in their contracts with employees. Others want in on this dandy arrangement. In an industry where much work is completely governed by weather, that is a body blow. Contractors in the Chicago region, to illustrate, have had only two really good construction months in the past twelve (July and August).

Contractors most certainly will continue to include a high contingency in estimating labor costs. Not all contractors heretofore have realized the seriousness of this situation, which has been developing for some time. A few firms have had a bad squeeze already on work contracted last year.

The big point is that very few state, county and municipal authorities see the handwriting. There is still the belief that prices are coming down.

Contractors as a group don't like to see higher prices that will discourage letting bodies from going ahead full steam, and there is plenty of competition to keep contractors individually from bidding unnecessarily high. They're bidding high because they want to stay in business.

Road and street officials will have to face this issue squarely. It's too bad to have to see inflation cheapen the buying value of road funds. But it's as bad or worse to delay starting postwar projects. Before deciding to throw out high bids this winter, officials should understand the labor outlook fully in their respective localities. New York's decision to raise estimates 15%, also noted in this issue, is a good move. Let's keep road building off dead center!

▼

Snow Plow Warning Signals

SNOW plowing days will soon be with us again. Let us hope that we won't see another winter like the last one in the Northeast.

Wartime shortages of equipment, parts and skilled men haven't been entirely erased by a long shot, but state, local and municipal snow crews are in general well prepared. One detail of preparation should be double-checked with particular care, however. That is the matter of safety lights and warning signals on plows. Traffic is much heavier again, and there'll be collisions during blinding snow storms unless every plow is properly equipped. The latest modern devices offer great safety advantages and their purchase is cheap insurance.

$750,000,000 Year Ahead in Road Building

States planning early start; notes on programs or projects of several state departments

EVEN before Senate action late in September released the big postwar road program, most of the states had made an early autumn start on projects utilizing state funds only or heldover federal funds. Federal-aid lettings are starting already, and it looks like a busy year ahead. Charles M. Upham, engineer-director of the ARBA, basing on a Federal Works Agency survey, puts 1946 highway expenditures including repairs at seven hundred and fifty million dollars, or more than double the 1945 low-ebb volume. This rate of expenditure is expected to nearly triple by 1949.

Of the billion dollars in highway and state projects estimated to be theoretically ready for letting, about 60% is state highway, 25% county and 15% municipal. Funds are in sight for initiating twice that. Unmatched federal balances, federal funds for '45-6 and '46-7, together with state matching funds, will come $2,212,000,000, not to mention $115,500,000 federal funds for public land roads.

On the big job ahead, James J. Skelly, ARBA president, noted that in the year before the war, it was estimated that we faced the need to rebuild, widen or relocate 106,560 miles of obsolete highways and widen or rebuild 21,682 bridges.

$270,000,000 War-Delayed F. A. Projects Given "Go Ahead"

Removal of war restrictions on use of Federal-aid highway funds, which have been frozen since the beginning of the war, makes possible the early starting of construction of projects totaling more than $270,000,000 throughout the United States, Alaska, Hawaii and Puerto Rico, observes H. A. Dick, president of the Associated General Contractors of America.

PRA Commissioner Thomas H. MacDonald stated that his District Engineers had been authorized to approve for immediate construction of programmed projects to be financed by these funds. Also that all Federal-aid projects under way when deferred on account of the war, may now be resumed. These projects provide for 316 miles, costing $16,300,000.

Construction may likewise begin on an additional 1,387 miles of highway costing $43,000,000, provided for in projects which were ready to start when Federal-aid funds were frozen.

From Unexpended Balances Federal Funds Available for Highway Construction Under Federal-Aid Program, by States

State	Apportioned for Programmed Projects	For Deferred Projects
Alabama	$ 948,939	$ 123,050
Arizona	403,186	.....
Arkansas	534,821	364,367
California	2,459,249	140,000
Colorado	2,008,339	1,024,067
Connecticut	986,850	.....
Delaware	1,936,116	555,285
Florida	1,417,006	765,865
Georgia	6,035,055	909,335
Idaho	556,202	177,825
Illinois	2,923,612	787,810
Indiana	1,438,415	3,094,931
Iowa	522,513	2,565,383
Kansas	4,208,335	2,754,727
Kentucky	439,385	.....
Louisiana	5,266,192	1,553,481
Maine	635,829	855,255
Maryland	440,949	.....
Massachusetts	4,196,700	931,277
Michigan	412,311	17,954
Minnesota	1,205,255	1,777,309
Mississippi	3,050,925	188,170
Missouri	1,763,049	2,975,706
Montana	3,645,577	385,284
Nebraska	949,932	47,720
Nevada	135,834	16,214
New Hampshire	776,643	.....
New Jersey	2,193,283	239,745
New Mexico	358,526	317,850
New York	8,421,371	211,106
North Carolina	4,280,779	1,486,975
North Dakota	2,080,286	1,275,830
Ohio	950,804	291,950
Oklahoma	4,958,503	2,571,231
Oregon	85,082	.....
Pennsylvania	4,785,540	778,996
Rhode Island	461,914	511,683
South Carolina	1,209,721	712,352
South Dakota	3,704,467	1,534,640
Tennessee	1,189,514	216,741
Texas	7,260,273	8,480
Utah	67,319	.....
Vermont	428,825	18,453
Virginia	2,883,902	.....
Washington	90,680	2,478
West Virginia	250,117	.....
Wisconsin	5,494,189	79,187
Wyoming	939,444	.....
Hawaii	545,558	494,904
Dist. of Columbia	32,339	.....
Puerto Rico	368,888	108,135
Alaska	.....	384,000
Total	$102,340,543	$33,255,745

New Jersey Already Begun

Eight major highway projects to be built entirely with state funds were initiated by the New Jersey state highway department as the "go" signal for launching its postwar construction program. Involving $7,000,000, these jobs were slated for early letting so that contractors could make a start before winter, and are expected to provide large scale employment in areas where there is a substantial volume of unemployment.

Largest project is the widening of Route 25 in the Elizabeth-Newark area. This $2,750,000 job will include 6-lane widening and several grade separations at traffic intersections. Route 25, the greatly overburdened artery between New York and Philadelphia, is also to have a $610,000 grade separation at Camden, eliminating an obsolete traffic circle. These projects are separate from the postwar Federal-aid program.

Texas Steps Up Lettings

Texas state highway lettings totaled $1,500,000 in August; a larger volume was let in September, and work for contractors will be stepped up steadily according to State Highway Engineer D. C. Greer. During the summer about $12,000,000 worth of old stagnant Federal-aid projects was approved for going ahead.

This is apart from the substantial repair and resurfacing program in which Texas has been engaged.

The Texas highway department is one of the leaders in the race to be ready with a large volume of F.A. plans. Plans are ready on $65,000,000 worth of work, or more than enough for the first year in a three-year program set at $173,000,000 minimum and $200,000,000 possible. All classes of roads are being pushed. The first postwar year's program calls for construction of 2,162 miles of secondary roads and 821 miles of primary. The department has the money, having invested $30,000,000 in shorter-term government notes under legislative authorization, in addition to a cash balance of $12,565,000 as of Aug. 1.

Especially noteworthy in Texas is the manner in which the department is attacking the engineering problems of providing modern expressways on the urban links of trunk routes through the four largest Texas cities, Houston, Dallas, San Antonio and Fort Worth. ["Roads and Streets" is planning an article soon.]

Maine Planning a Turnpike

Contracts for construction of the 250-mile section of the Maine Turnpike will be let next spring at cost of thirteen million dollars.

Comparable in many aspects to the Worcester Turnpike in Massachusetts, and the Merritt Parkway in Connecticut, this ambitious project had its completion in 1941, when the present authority was created and traffic and economic studies undertaken.

To be engineered as a self-liquidating project, the turnpike program is based on proposed tolls of of 50 cents for passenger cars and $1.25 for trucks. Two million vehicles annually are expected to use this highway, which will include adjacent plane landing strips.

Pennsy. Also Has Turnpike Plans

Governor Martin of Pennsylvania has announced that his state intends to extend the Harrisburg-Pittsburgh superhighway to Philadelphia or construct a modern multiple-lane connecting link from Harrisburg to Philadelphia. This route presently includes the famous Pennsylvania Turnpike, and consideration may be given to extension of the toll road idea.

The state highway department is considering several schemes of reconstruction from the eastern terminus of the turnpike for an immediate 16-mile project.

California Plans

The California division of highways is ready to launch work totaling nearly eighty million dollars, contracts to be let at the rate of eight to ten million dollars a month on major projects, most of which constitutes new mileage on interstate system.

Notes From Other States

Minnesota (O. L. Kipp, chief engineer): State making a slow start due to labor scarcity and continued high bids. No bids were received on some projects and only one or two on others in Sept. letting. A 9-mi. grading job on the griddle this fall. Lack of contractor personnel and equipment for immediately going ahead on sizeable projects given as a factor in uncertain outlook until spring.

Michigan (H. C. Coons, deputy commissioner): Due to the fact that everybody is on 20-week unemployment compensation, with plenty of strikes and labor unrest, this Department does not plan on letting any work until conditions become more settled. Our contractors this past summer have had a great deal of trouble in keeping a complete crew to do a relatively small program of maintenance betterments totaling approximately three million dollars. We will perhaps take bids on a few guinea pigs, but with prices badly out of line and labor unable to be obtained, we intend to sit back and wait.

New York (H. O. Schermerhorn, acting chief engineer): Hope has been to award $35,000,000 by Jan. 1, 1946. Only half of earlier bids have been accepted due to high prices. However estimates have been increased 15% over 1940 figures, making it possible for bids to be accepted that are as high as 35% over actual 1940 letting prices.

Oregon (C. B. McCullough, asst. state highway engineer): Oregon initiated its postwar highway construction program with a contract letting Oct. 29 and 30, when bids were received on seven construction projects at $1,300,000. Succeeding lettings at 5-week intervals will run to about $2,000,000, until some $12,000,000 in work is "out" by May 1.

Among the larger of the projects to go under contract soon are roadbed construction on the Columbia River Highway, U. S. 30, east of Portland ($1,500,000); Harbor Drive in Portland ($1,000,000); a 42-mi. relocation on Dalles-California Highway, U. S. 97 (grading $670,000); 15 miles new construction, Wolf Creek Highway near Portland (grading $700,000); and 34 miles of resurfacing and oiling on the Central Oregon Highway ($440,000).

Montana (H. W. Holmes, state highway engineer): With $20,800,000 available for the first postwar year, actual accomplishments will depend on availability of trained and experienced highway department personnel and speed with which contractors can build organizations.

S. Dakota (E. W. Meeker, state highway engineer): Holdover F. A. letting planned on 20 miles of grading and base course.

N. Mexico (F. G. Healy, state highway engineer): About three million dollars of lettings this fall, comprising 36 miles of grading and base course in three jobs. Drafting room hitting stride on 1946 work.

S. Carolina (C. R. McMillan, state highway engineer): Expect full volume of lettings by next March. Several big bridges involved.

Nevada (Robert Allen, state highway engineer): One 15-mi. $750,000 job to be let in November. About three million dollars in cold northern section to wait until spring.

Arizona (from J. S. Mills, engineer of contracts and specifications): 40 miles of grading and oil surfacing will be let before new year.

Connecticut (A. W. Bushell, deputy commissioner): Lettings began immediately after V-J Day, including $612,000 grading on Merritt Parkway, large section of Wilbur Cross Parkway and other work totaling $3,350,000 to date. Million-a-month lettings planned all winter.

N. Hampshire (F. E. Everett, commissioner): One urgent bridge project to be let soon. Other ready projects to be postponed until next year due to scarcity of labor.

N. Carolina (W. Vance Baise, state highway engineer): First postwar letting Oct. 9 brought bids on 14 projects totaling two million dollars. They were 16% over estimate. Eight awarded, rest rejected. November lettings involved $2,500,000 in 20 projects, including two large bridges. Lack of engineers to slow additional lettings.

Maryland (Austin Shure, asst. chief engineer): Several large projects to be let soon including Sandy Hook Bridge and approaches on U.S. 340 across Potomac east of Harper's Ferry ($900,000); 18-mi. paving job on U.S. 40, Frederick - Hagerstown ($1,170,000); city bypass project on eastern shore. 6-mi. ($600.000).

Maintenance — Minnesota counties spent nearly $10,000,000 for maintenance of roads under their jurisdiction in 1944, according to figures compiled by the State Highway Planning Survey. Maintenance of 15,585 miles of state aid roads cost $4,389,-640 and 27,984 miles of county aid and county roads cost $5,361,243. The total was $1,529,000 more than in 1943, and $2,158,000 more than in 1941, last pre-war year.

Sorry We Are So Late!

The three-weeks' strike of typographers in Chicago tied up your October issue of "Roads and Streets" along with 200 other publications. But here it is at last, including a special 10-page article on Airfield Pavement Maintenance. Look soon for your November issue which will carry a dozen timely features.—THE EDITORS.

ARBA to Meet Jan. 14-17 in Chicago

The 1946 annual meeting and convention of the American Road Builders' Association will be held at the Stevens Hotel, Chicago, Jan. 14, 15, 16, 17, 1946.

The convention, coming as it does, immediately prior to the beginning of the 1946 construction season, will be of unusual importance and interest. The latest developments in design, construction and engineering for highways and airports will be presented . . . And representatives at the convention from all branches of the highway profession and industry affords the exceptional opportunity for a complete interchange of ideas. Mark the dates on your calendar and make your reservations early!

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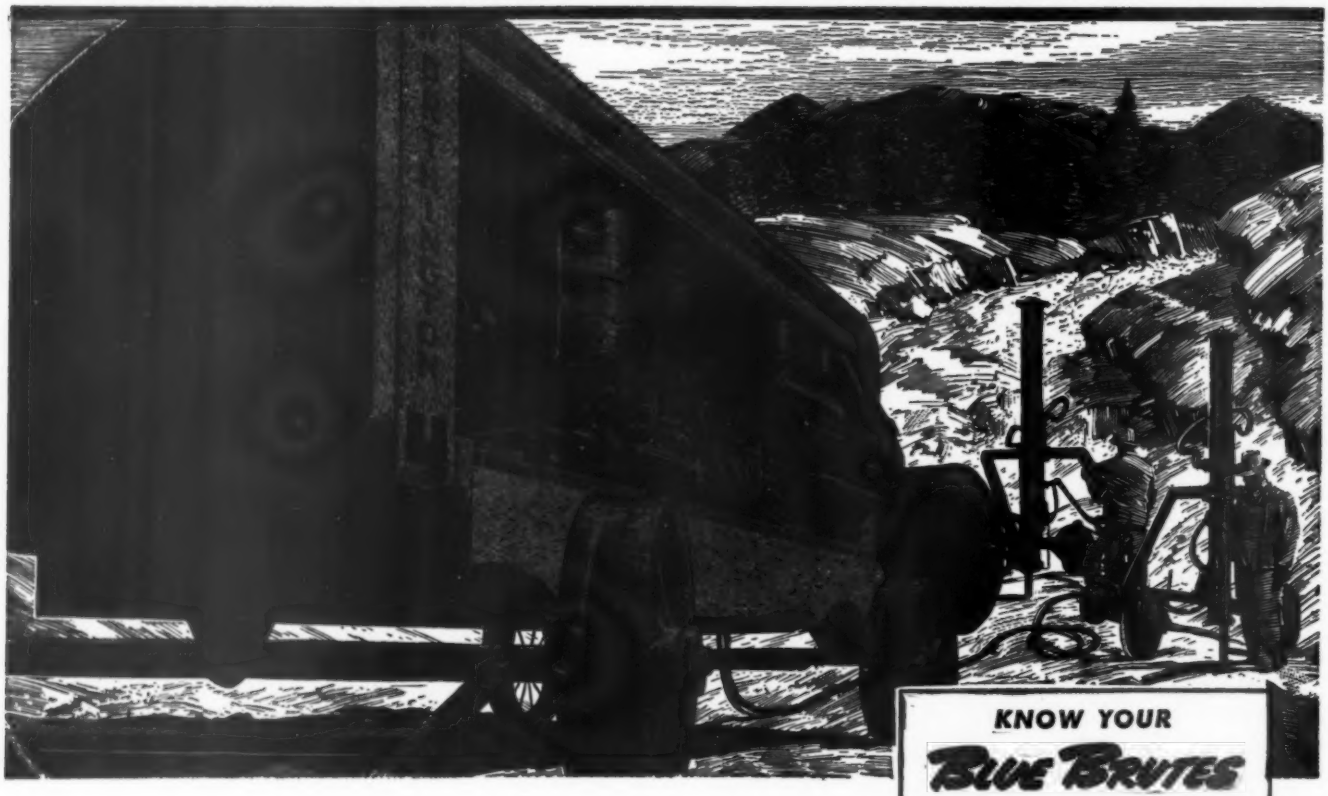

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Blue Brutes include: Pavers, Concrete Spreaders**, Concrete Mixers, Concrete Placing Equipment, Big Mixers, Finishing Machines**, Pneumatic Placing & Grouting Equipment, Truck Mixers, Plaster & Bituminous Mixers, and related equipment.

2.
Blue Brutes also include: Diesel, gasoline and electric driven Portable Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs; Rock Drills and Air Tools in a wide range of weights and sizes; Contractors' Pumps.**

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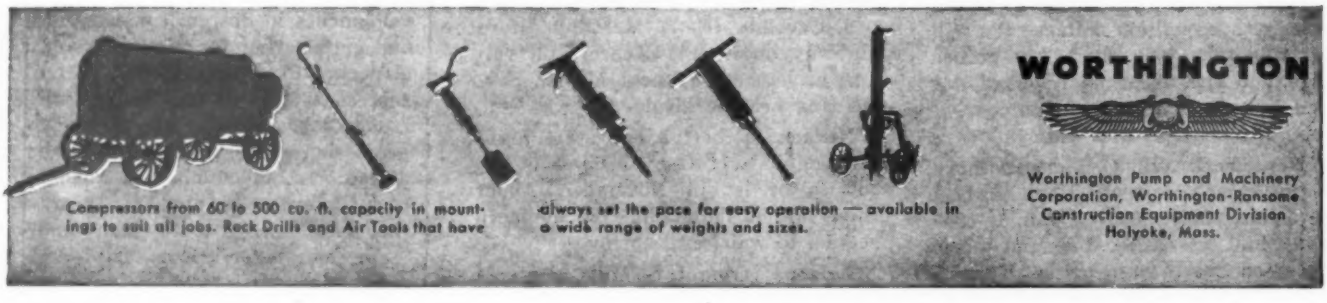
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Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.
Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division Holyoke, Mass.

Worthington-Ransome Blue Brute Distributors

By referring to the advertisement on page 72, you'll learn the meaning of the (1), (2) or (1-2) beside their names.

Ala., Birmingham (1) J. D. Pittman Tractor Co.
Ariz., Phoenix (2) Smith Booth Usher Co.
Ark., Fort Smith (2) R. A. Young & Son
Little Rock (1) Kern-Limerick, Inc.
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Calif., Los Angeles (1) Garlinghouse Bros.
Los Angeles (2) Smith Booth Usher Co.
San Francisco (2) Coast Equipment Co.
Colo., Denver (2) John N. Meade
Denver (1-2) Power Equipment Co.
Conn., Hartford (2) The Holmes-Talcott Co.
New Haven (1) W. I. Clark
Waterbury (1) Contractors Supply Co.
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Tampa (2) S. M. Regar
Ga., Atlanta (2) Tractor & Machinery Co.
Savannah (1) Morgans, Inc.
Ida., Boise (1-2) Olson Manufacturing Co.
Ill., Chicago (1-2) Chicago Construction Equipment Co.
Chicago (2) John A. Roche
Chicago (1) Thomas Hoist Co.
Ind., Fort Wayne (1) American Steel Supply Co.
Indianapolis (2) Reid-Holcomb Co.
Iowa, Des Moines (2) Electric Eng. & Const. Co.
Ky., Harlan (2) Hall Equipment Sales Co.
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St. Paul (2) D. L. O'Brien
Miss., Jackson (1) Jackson Road Equipment Co.
Mo., Clayton (1-2) The Howard Corporation
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Kansas City (2) Machinery & Supplies Co.
St. Louis (2) W. H. Reaves
Neb., Lincoln (1) Highway Equipment & Supply Co.
N. J., Hillside (2) P. A. Drobach
Newark (1) Johnson & Dealaman
North Bergen (2) American Air Compressor Corp.
N. M., Albuquerque (2) Bud Fisher Co.
Albuquerque (1) Morrow & Co.
Roswell (2) Smith Machinery Co.
N. Y., Albany (1-2) Milton-Hale Machinery Co.
Buffalo (2) Dow & Co., Inc.
New York (2) Air Compressor Rental & Sales
New York (1-2) Hodge & Hammond, Inc.
New York (1-2) Railroad Materials Corporation
Olean (2) Freeborn Equipment Co.
N. C., Raleigh (2) Carolina Tractor & Equipment Co.
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O., Cincinnati (2) Finn Equipment Co.
Cleveland (2) S. M. Clancey
Cleveland (1) H. B. Fuller Equipment Co.
Cleveland (2) Gibson-Stewart Co.
Marietta (2) Northwest Supply & Equipment Co.
Toledo (1) Edmund Supply Co.
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Houston (2) Dye Welding Supply Co.
Houston (1) McCall Tractor & Equipment Co.
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Vt., Barre (1-2) A. M. Flanders, Inc.
Va., Richmond (2) Highway Machinery & Supply Co.
Wash., Seattle (1) Columbia Equipment Co.
Seattle (2) Star Machinery Co.
Spokane (2) Andrews Equipment Service
Spokane (1) Columbia Equipment Co.
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Fairmont (2) Interstate Engineers & Constr., Inc.
Wisc., Milwaukee (1) Mekeel Engineering Co.
Wyoming, Cheyenne (2) Wilson Equipment & Supply Co.

Buy Blue Brutes

Worthington Pump and Machinery Corp.

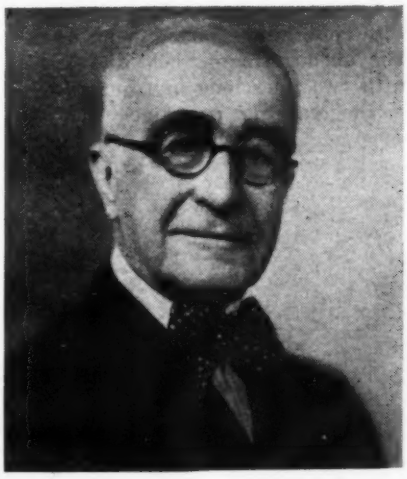
Worthington-Ransome Construction Equipment Division
Holyoke, Massachusetts

George Bartlett of "Bartlett Award" Passes

George S. Bartlett, nationally famed as the greatest single influence in the use of concrete roads, died recently in Chicago at age of 87.

His initiation into the field with which he was later to become so widely known, was in 1884, when he became manager of the Milwaukee Cement Co. In 1905 he took charge of the old Western Portland Cement Co., at Yankton, S. D., and later joined the Marquette Cement Manufacturing Co. of Chicago.

In 1912 he joined the Universal-Atlas Cement Co. at Chicago to enlist in the promotion of concrete roads; was vice-president of the Edison Portland Cement Co. of Orange, N. J., for three years, and returned in 1916 to Universal-Atlas where he served as special representative for 15 years. In 1931 he became assistant to the chairman of the board of the Portland Cement Association, Chicago, a position occupied until his death.



To Mr. Bartlett's originality is attributed the unusual method of promotion by which the concrete road was brought to the attention of the country, and to his vigor and resourcefulness are due a large measure of the early credit for its extraordinary development. Working with the late Edward N. Hines, chairman of the Wayne County (Detroit) Board of Road Commissioners, who had laid down some experimental stretches of concrete paving in 1909, and with the late Benjamin F. Affleck, then general sales agent of the Universal Portland Cement Co., Mr. Bartlett proceeded on the theory that since it was not possible to take the concrete road to the customer, it would be necessary to take the customer to the concrete road. He took to Detroit many guest parties of officials and engineers from different parts of the country.

As a mark of respect and to establish a permanent symbol of his achievements in the highway field, there was created by his countless friends, the George S. Bartlett Award, consisting of a plaque bearing a bas relief of his likeness. The award is sponsored by the American Association of State Highway Officials, the American Road Builders' Association and the Highway Research Board of the National Research Council, and is awarded annually by the presidents of these organizations to a selected individual "for outstanding contribution to highway progress." The first award was made in 1931.

▼

Meetings Ahead

Associated Equipment Distributors Annual Meeting, Edgewater Beach Hotel, Chicago, January 27-31.

* * *

Wisconsin Highway Conference (County Highway Commissioners and Committee Members Assns.), Schroeder Hotel, Milwaukee, Jan. 15-18.

* * *

1946 Michigan Highway Conference, Pantlind Hotel, Grand Rapids, Feb. 26-27-28.

* * *

North Atlantic States Highway Officials' Association, Annual Meeting, Pennsylvania Hotel, New York City, Feb. 12-13-14 (tentative).

* * *

Purdue University Road School and Show (32nd Annual), Lafayette, Ind., Jan. 23-25.

* * *

American Association of State Highway Officials, Annual Meeting, Oklahoma City, Jan. 29-30-31, Feb. 1.

* * *

American Road Builders' Association, Annual Meeting and Convention, Stevens Hotel, Chicago, Jan. 14-17.

* * *

New York State County Superintendents' Association Meeting, Albany, N. Y., Jan. 23-24-25.

JOB and EQUIPMENT IDEAS

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No Slope Too Big to Blade

At least this is the impression gained from the accompanying photos from the files of Chief Construction Engineer Fred E. Swineford, Ohio state department of highways. It's all in the hitch.

Photos Nos. 1 and 2 show how the more ordinary sized slope should be dressed with a pull grader and a single tractor. These scenes are from a job in Butler County, Ohio, Ed F. Smith, contractor.

Photos Nos. 3 and 4 show a decidedly more ambitious undertaking. This high cut slope, through clay material containing loose rock, was successfully smoothed by towing a heavy tow-type, steel-wheeled blade grader, two tractors were needed, one ahead furnishing the pull, and one spotted immediately above (slightly ahead) of the grader acting as an anchor. Ralph Myers was the contractor on this job in Harrison County, Ohio.

The trick here was to experiment with rope hitches and towing angles. The anchor tractor held the grader with two lines, one in front and one in the rear, the rear line.

You'll Be Sorry . . .

From "Highway Extension News," edited by Ben H. Petty, Prof. of Highway Engineering, Purdue University, LaFayette, Ind.

In the few trips taken since returning to Purdue, a tendency has been noted of ignoring the limitation of maximum size of gravel for road work. Apparently, in some localities, there has been a let-down on rigid specifications governing the top size of pebbles to be used in gravel road maintenance. Resort has been made to unscreened pit-run gravel. Even

Photos 1 and 2. This is easy

Photos 3 and 4. This is harder to do, but worth a try, thought Ralph Myers

where purchased from commercial plants, "passing 1½-in. screen" has been resorted to. You will be sorry you did it. Your roads always will be rough, maintenance will be more expensive and wear on tires will be greater. Don't put anything on a gravel road that will not pass through a ¾-in sieve! Crush the oversize to pass this screen instead of wasting it if there are appreciable quantities. The angular-shaped, crushed particles will aid in better compaction. You will have better roads, less dragging, more comfortable for traffic and easier on tires.

▼

Simple Device Protects Truck or Scraper Dual Tires From Sharp Rocks

A simple device that can be made at a cost of less than five dollars can save contractors many dollars by protecting double-track tires on trucks or scrapers from damage by rocks and sharp objects, which would otherwise become wedged between the tires.

The gadget, which was thought up by U. S. Army Warrant Officer Heimo Raski, consists of a 3¼-in. metal bar attached to the scraper frame above the tires (see photos). The bar is inserted between the tires and rests on the wheel hub. When the vehicle is in motion the device tosses rocks clear of the tires. The bar can be used on truck tires by adjusting it to the axle.

Raski's idea was first put to use in July 1943, when he was with the 46th Engineer Construction Battalion on Kiriwana Island. The Battalion which had the gadget accredited by general headquarters in the Pacific, used it to protect tires from coral rock in the atolls. Since its original diagram was filed, Raski's tire conservation device has been adopted by Army commands all over the Pacific and is said to have saved the U. S. Government thousands of dollars.

Embankment Dressed With Rooter Unit Converted to Scoop

How to dress up a water-side embankment which had been given a protective layer of slag was neatly solved by A. J. Baltes, contractor, on a job in Trumbell County, Ohio, in 1944. The slag had washed down the slope, as a result of wave action undermining the toe and filtering out the smaller particles. The problem was to drag some of the slag back up the embankment in an attempt to get an even, stable slope. Referring to accompanying pictures, note how this was done with a heavy tractor working up slope with a—rooter? No, look again. The rooter teeth have been removed and in their place a scoop was installed. Said scoop consisted of a piece of grader blade with side plates welded on each end, the blade being held by two welded shanks inserted in the rooter frame in place of the rooter teeth shanks.

According to Fred Swineford, Ohio's road construction chief, the scoop worked fine, but didn't end the problem of continued wave action. Other scene shows a freshly dressed slope, with slope template boards still in place.

▼

Small Stumps Moved with Sideboom

A small tractor equipped with a sideboom performed handy clean-up chores on Ziegler Construction Company's clearing and grubbing job, US 11, Alabama. It is shown here piling smaller stumps and debris for burning, thus relieving the heavy dozer for more important duty.

*

*

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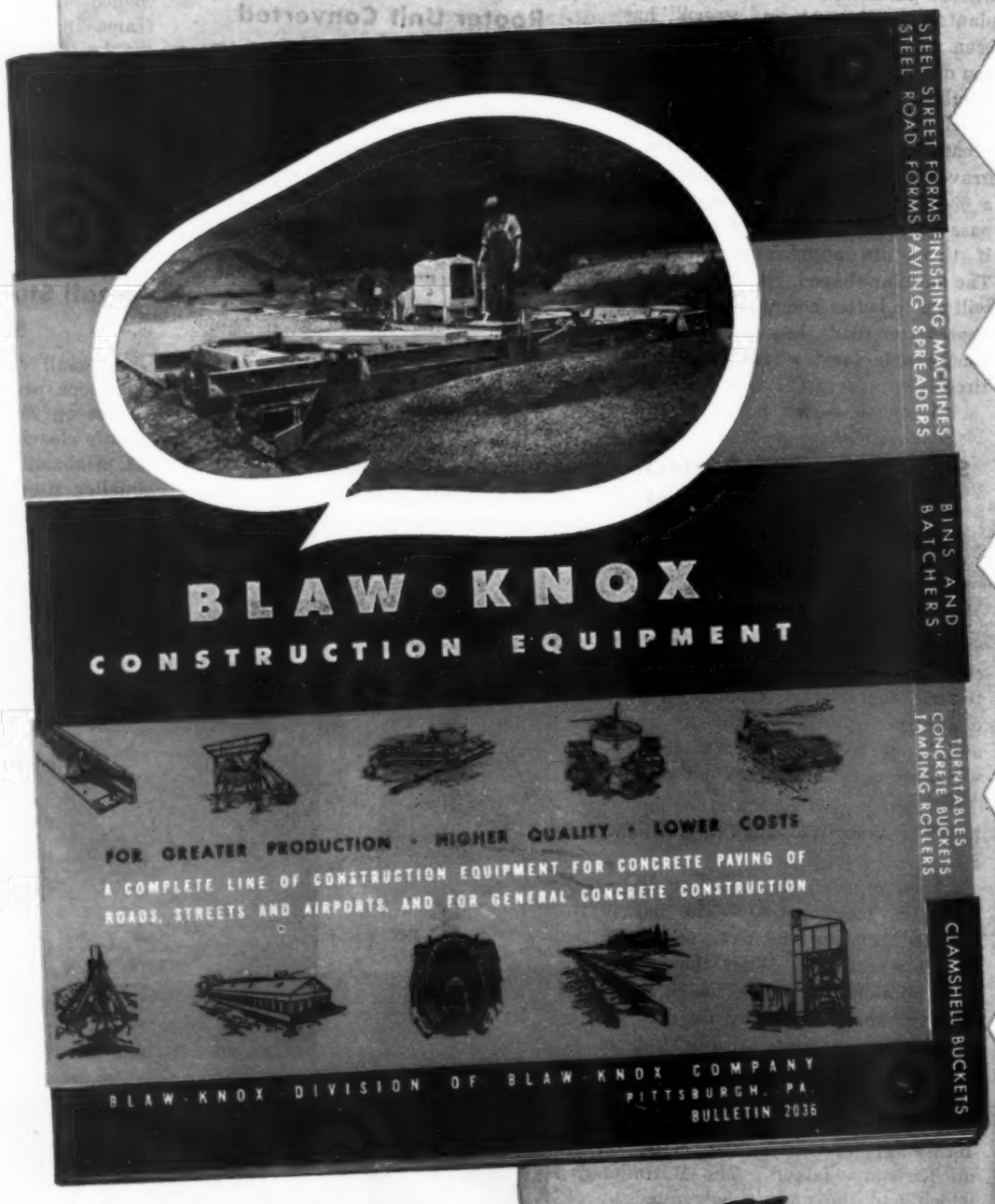

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"Bird baths," tell-tale evidence that corrective maintenance is overdue and had better be done quickly before costly structural failures occur

Airfield Pavement Maintenance

Methods used by the U. S. Army 8th Service Command in upkeep of 175 airfields

ACCELERATED use of airfield pavements by heavy planes has definitely shown the necessity for effective, every-day patrolled maintenance.

Proper and effective maintenance of pavements is fully as important as proper design and construction procedure. As is true with all other types of construction, maintenance must begin the day after construction is completed, and must be continuous throughout the year.

The primary objects of maintenance are: (1) keep a smooth surface, assuring quick and effective runoff; (2) keep the underlying base or subgrade dry; and (3) maintain contact between pavements and underlying courses. This requires effective slopes leading to drainage outlets, one hundred percent waterproof surface, and continual correction for consolidation or movement in supporting courses below. There is no substitute for preventive maintenance, and constant patrolling is essential in order to detect and correct today those conditions which would progress into failures next year.

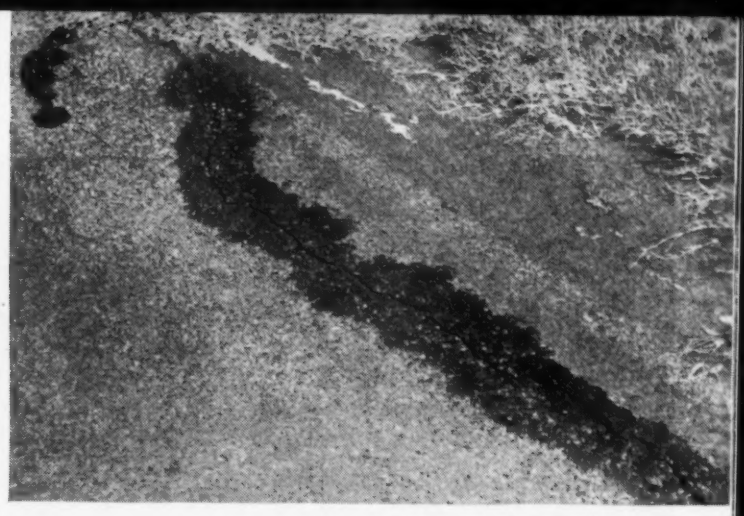
The first and most necessary preventive maintenance is to keep all drainage facilities functioning properly. A dry sub-base seldom fails, and a properly constructed pavement is built on this kind of sub-base. Good drainage is absolutely the first requirement for the prolonged life of any pavement, flexible or rigid. Quick runoff is paramount. Anything that stops, slows down, or impedes water on or adjacent to paved areas is detrimental and is a constant contributor to causes of failure.

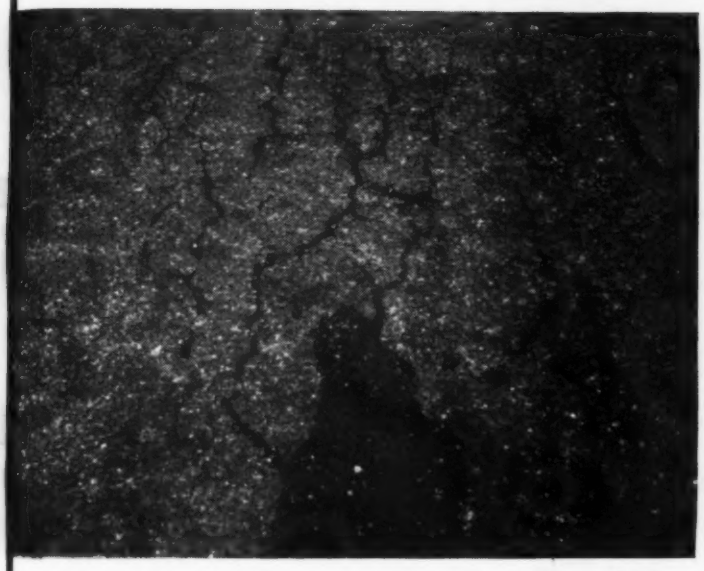
High shoulders, ruts, weed clumps, anything that retards water, will encourage its infiltration into the soil or base material. In the case of high shoulders the infiltration is at a very critical point. The water will seep under the pavement edge, and edge cracks or breaks are often the result. (See photo opposite page.)

A periodic inspection of the entire drainage system should be the regular assigned duty of a dependable staff man. Drop inlets in remote locations are easily forgotten. Choking of the grates will cause excessive ponding which might occur at several inlets at the same time. When this condition exists at the time of peak precipitation for which the drainage system was designed, destructive flooding results. Should the choke barriers break suddenly, as they are likely to do when the pond head builds sufficiently high, the entire storm sewer would be overloaded, creating ponding at critical inlets such as might be located in hardstanding areas, drains at hangar entrances, oil and grease traps at washracks, etc.,

This authoritative summary covers methods developed and currently used by Engineers in the U. S. Army, Eighth Service Command, ASF, Dallas. It is based on a movie on this subject privately prepared by personnel of the Roads, Runways and Railroads Section, Maintenance and Repair Branch, Office of the Service Command Engineer, this film being intended to instruct and sell post engineers on proper pavement maintenance. The magnitude of the airfield maintenance job is shown by the fact that there are some 175 military fields in the five states of this Command area alone. Runways comprise a major percentage of military pavement installations in the area presently equivalent to 17,000 miles of 20-foot roadway.

As brought out here, skillful, prompt maintenance can prolong runway life often at an annual cost amounting to only a fraction of one percent of the original investment. With a large civil airfield development program in the offing, and with serious and growing airfield maintenance problems now confronting many municipal and other authorities, no time should be lost in making all possible military experience available. The following review is indeed a valuable and timely contribution. Write us promptly if interested in a quantity of reprints.—THE EDITOR.





Typical failures for which repair delay is costly. (Upper left): Subgrade has failed. (Upper right): Crack in asphalt roughly paralleling pavement edge, through which subgrade water has seeped. (Lower left): Crack pattern denoting need to liven or replace asphaltic surface. (Lower right): Clogged field inlet grating after storm

which could cause severe damage. A good drainage system, well maintained is imperative.

I. *Flexible Pavement Maintenance*

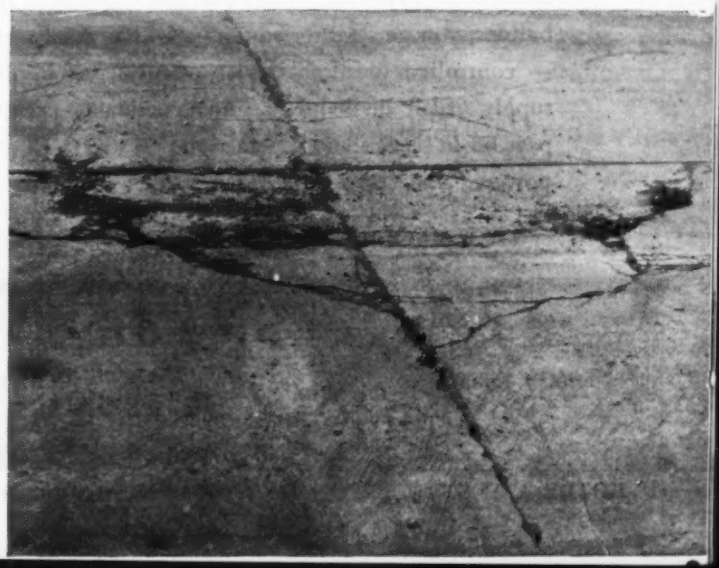
Flexible pavements are undergoing continuous movement due to additional consolidation of subgrade or base and swelling or shrinkage of subgrade materials. "Bird baths" or standing water pools are the result.

When water is allowed to stand on pavement it will find its way through if the way is there. Some pavements will in time become saturated and temperature reactions will assist in eventually creating a way through.

Infiltration into the base is of course the beginning of base saturation which inevitably results in pavement distress. Timely elimination of "bird baths" of even the smallest dimension is prime preventive maintenance of the highest degree.

An inspection during or immediately after a rainfall will disclose the location of all "bird baths." These areas should be marked by painting an out-

(Left): How failure usually begins in concrete—at the intersection of joints which lack adequate load transfer. (Right): Corner failure shown at left soon progresses into something like this. Prompt repair action should begin before this stage is reached



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Runway Repairs Offer Growing Contract Opportunities

More and more contractors will find their services needed in connection with repairing of airfield pavements, it is seen from the accompanying article. The Eighth Service Command has already let considerable runway repair work to contract, as this article notes. As more and more airfields are turned back to civil authorities, the need will grow for contractors qualified in experience to undertake this type of work.

line of the perimeter. Heavy spikes, driven till the head is at water surface grade, will indicate depth after drying.

Multiple Surface Treatment for Shallow Depressions

Shallow "bird baths," ¼ to ¾ in. deep, can be eliminated by multiple surface treatment applications. A single bituminous treatment will build up a depth of ¼ to ⅜ in., using ordinary cover aggregate. The deeper parts in the center are allowed to take up as much aggregate as possible. Edges are feathered by hand brooming to prevent scallops in the finished patch. Flat wheel rolling insures maximum penetration of the aggregate and coating by the asphalt.

This type of patch should only be used where depression can be filled with not more than three applications. Too rich a patch may cause "shoving" and thus become corrugated. Care must be exercised in making each application to see that the proper amount of asphalt is used, and in no case should it exceed 0.35 gal per sq. yd. per application. Each application is thoroughly rolled, allowed to cure, and broomed free of loose material before making succeeding application. Treatments can be made with cutbacks, but oil-asphalt, penetration between 120 and 200, heated to between 300 and 350 deg. F, is best adapted for the purpose.

A.C. for Deeper Depressions

A depression ¾ in. or more in depth is more easily filled and leveled with asphaltic concrete than by multiple surface treatments. Cold mixed asphaltic concrete aggregates are available commercially, or may be prepared at the field. Native of fluxed rock asphalts with a relatively fine graduation specification, and a relatively high asphalt content, are well adapted for the purpose. An RC cutback or emulsified asphalt is pre-

ferred for the tack coat, which should be thinly applied, not over 0.15 gal. per sq. yd. on reasonably smooth pavement, and allowed to dry. Strike-off boards of various lengths are prepared with a slight crown allowance. Crown should be ¼ the depth of the depression so that surface will be flat after rolling. If aggregate is struck off flat, a depression will still be there after material is compacted. A surface treatment will seal the surface of the patch and tie the edges down tight.

Regular Patrol Essential to Catch Shrinkage Cracks

Regular patrol of airfield pavements, especially runways, cannot be overstressed. Patrol in search of shrinkage cracks is not successfully accomplished in an automobile. To be properly done, several men, so spaced that the entire surface can be carefully scrutinized, are required to walk abreast the entire length of the runway, marking each crack as found. A patrol of this kind should be accomplished over every square yard every four to eight weeks. A daily patrol in an automobile in search of damage from landings or other causes is good practice.

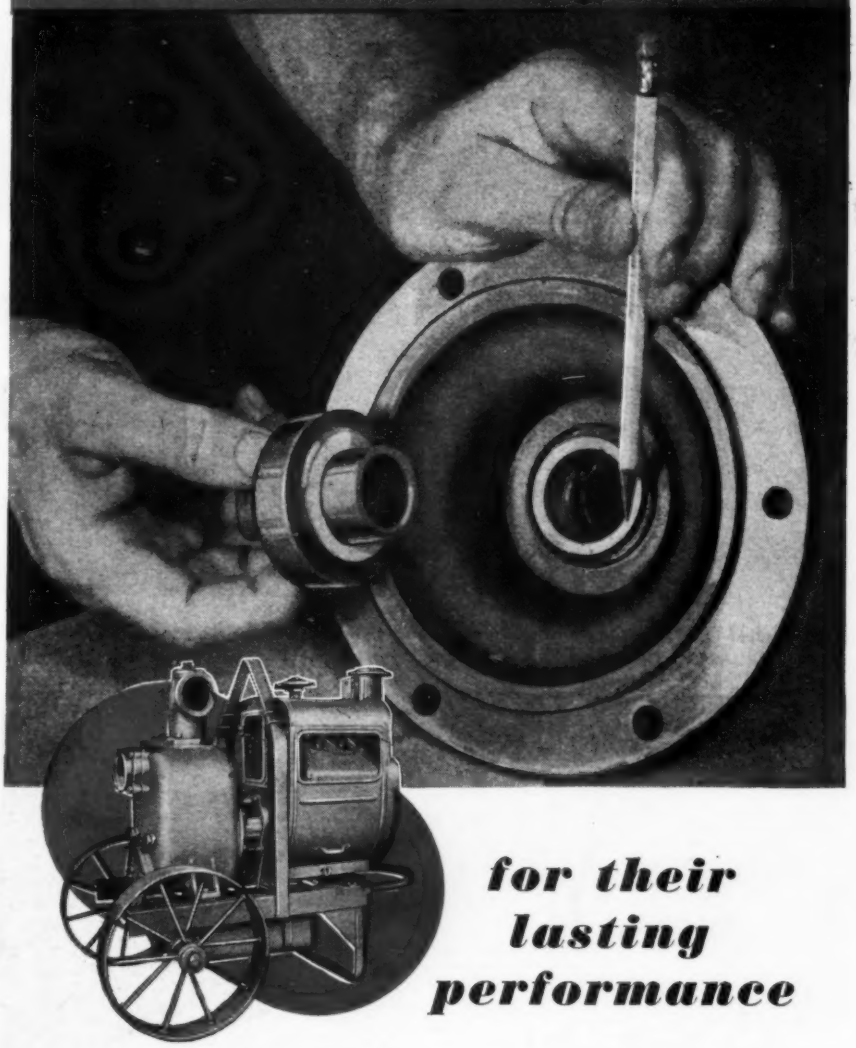
Patrolling and marking alone are not sufficient. Sealing must be accomplished immediately, before the markings are obliterated or fade out. Hot cutback asphalt will best serve the purpose because it will penetrate deeper into the small cracks. Some cracks may need cleaning before they are filled, and sometimes the asphalt will go down, leaving the upper part of the crack open, in which case a second or third treatment of heavier oil asphalt is necessary. Blotting with coarse sand will eliminate tackiness if this becomes objectionable.

Base Failures and What to Do

When water enters the base course, either through surface cracks or from sub-surface sources, the base is softened by saturation, and passing wheel loads cause deformation and failure. Optimum moisture content is the amount of water the base material or subgrade can contain without loss of stability, or just enough to fill all voids under maximum compaction conditions in accordance with adopted standards. When this amount is exceeded, the aggregate is lubricated, swelling occurs, and pressure of any sort or from any direction causes deformation. The comparatively brittle pavement cracks and breaks from resulting shear or flexural stresses, and complete failure results.

Investigation should always be made to determine whether the failure is the result of a saturated base

Here's the Reason-



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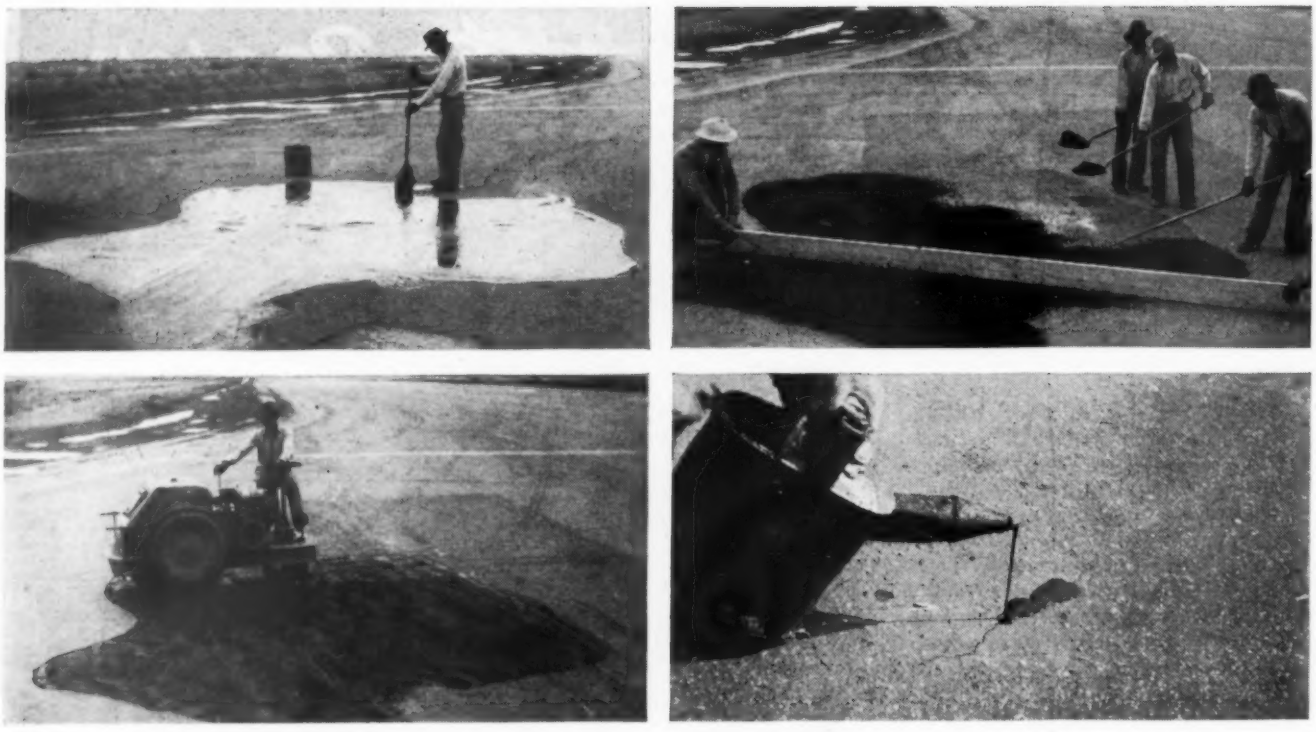


(Upper left): Tack coat prior to building up "bird bath" with asphaltic concrete. (Upper right): Applying asphaltic concrete and screeding to grade. (Lower left): Rolling completed patch. (Lower right): Filling adjacent cracks with asphalt or cut-back asphalt

Construction of asphalt skin patch: first application completed and making second application; below is finished patch

or mere consolidation. If the latter, it is useless to remove the material and attempt to rebuild. The solution is to add additional surface material and take full advantage of the undisturbed base with its additional compaction.

On the other hand, if it is determined that the base and/or subgrade is saturated and has lost its stability the material must be removed, dried to a proper moisture content and recompacted to maximum density ready for renewal of surface. Source of moisture must be determined and corrected to prevent recurrence. In repairing small areas care must be exercised to prevent damage to surrounding areas. A 10% admixture of cement will often increase the stability of the base and a pneumatic tamper is recommended in securing full compaction, particularly around the edges and in corners. Base must be cleaned of all lose material and primed before surfacing is replaced. Frequently the old surfacing can be pulverized with a blade, livening up with a small amount of cutback and reused in the patch. However, the use of new material in the base and surfacing is sometimes faster and more economical, particularly in small areas. In all cases the patch must be firmly bonded to the base, thoroughly

Note ball of cement-stabilized material; a quick, rough field test for proper moisture content

Cement-stabilized base patch material being bladed and rolled. Cement sacks are emptied by hand at computed intervals and spread. In foreground is a second patch area from which old base material has been removed

compacted and waterproofed with a seal coat.

When to "Liven" Old Surfaces

Asphalt surfaces naturally become brittle and develop shrinkage cracks with age. This particularly is true where infrequent application of loads fails to provide sufficient kneading action of surface. A rule of thumb test for liveliness is to dig out a small chunk with a knife, warm it in the hands, and inspect for tackiness. A live surface will ball up in the fingers. A dead surface will crumble under manipulation.

Old surfaces can be effectively livened up and waterproofed by the application of from 0.1 to 0.15 gal. per sq. yd. of cutback asphalt (preferably MC-3) applied in hot weather and followed immediately with full coverage of a pneumatic roller. This method squeegees the asphaltic material into small cracks, penetrates into the old material, and leaves an effective waterproof sheen on the surface. It will lose its tackiness in 48 hours and ordinarily requires no cover material. However, a coarse sand can be used for cover material where pooling occurs or where immediate use requires a blotter material. This application is not only a quick and economical livening-up course but also is considered a worthwhile tack coat which prepares the surface for a seal coat if considered necessary at a later date.

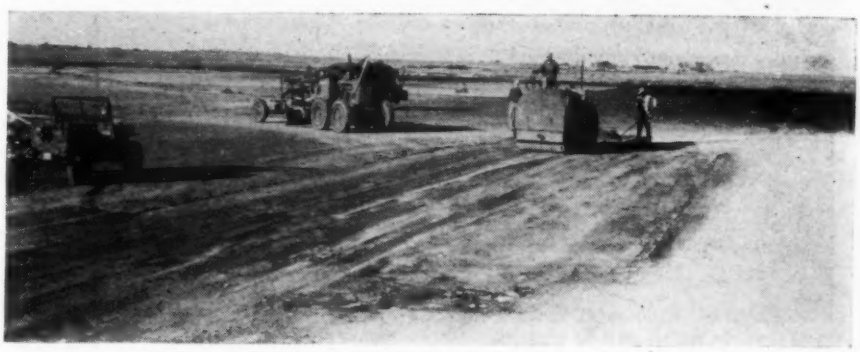
II. *Concrete Pavement Maintenance*

Concrete, especially concrete pavement, like all other things "man-made," is only as permanent as our effort to prevent those occurrences that will cause its destruction. Preventive maintenance starts immediately upon completion of the new pavement.

Important to Understand How Pavements Fail

The point of weakness in a concrete slab is at the corner where flexure is greatest, and this is where trouble usually starts. When joint filler separates neatly from the concrete it is usually caused by flexure. If it were possible to construct an absolutely rigid sub-base, the need for a concrete pavement would be eliminated. Since the sub-base is not rigid, and since concrete does have a modulus of elasticity, it will bend under applied or internal pressure. It can only bend downward as the sub-base bends with it, so when the bearing ratio of the sub-base is exceeded by an applied load, bending of the concrete slab occurs.

Water is the world's greatest and most prevalent softening agent, and when an excessive amount comes in contact with pavement bases or subgrades, softening process begins. The bearing ratio is immediately reduced, the concrete slab bends or flexes under applied loads, and continued flexing of the slab creates a void. The addition of more water and more flexing causes greater voids. The elastic limit of the concrete is eventually reached and a break occurs at the weakest point, usually the corner. One void or cavity encourages anoth-



Replaced salvaged asphaltic concrete, ready for seal coat. (Lower view): Applying cutback asphalt to revitalize salvaged asphaltic concrete

er, and in due time extended failures result.

The sub-base also has a modulus of elasticity. It is much less than that of the concrete, and when softened by wetting, it approaches zero. When the slab bends on a wetted base, the base does not recover its original shape, and a space or void is left below the slab. Repeated bendings of the slab continue to depress the base until the bending limit of the slab is reached, at which point there is no more bearing on the base, and breaks are inevitable. The breaks are accelerated when concrete joints are left open and water enters the void. Flexing then creates mud which is squeezed through slab openings out upon and adjacent to pavements with a pumping motion, and the void is enlarged.

Sometimes overloading the pavement will cause additional compaction of the base, and create voids without the presence of water and its softening effect.

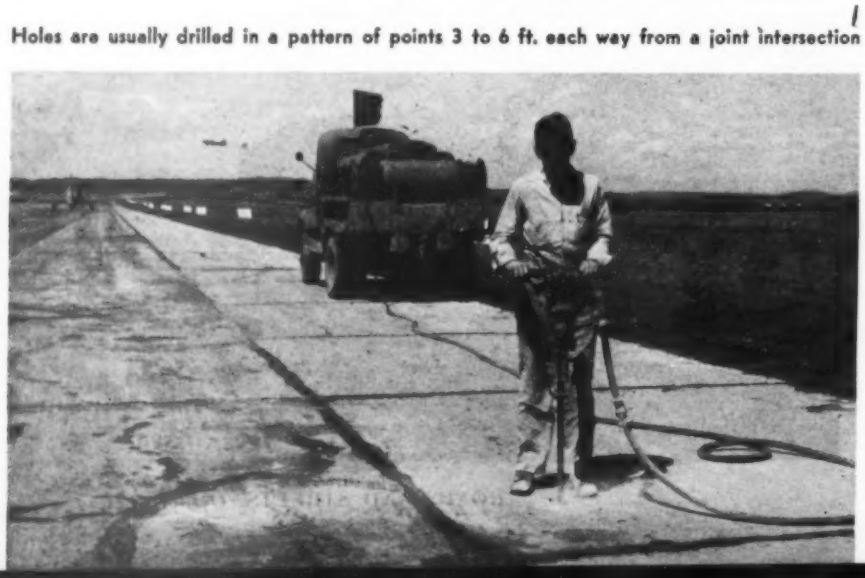
Most failures in concrete pavement can be prevented with timely preventive maintenance. When such conditions are suspected investigations should be made to determine existence of voids. The procedure may be either to drill occasional holes, to remove small sections of pavement, to dig test holes adjacent to slab, or make visual inspection of pumping action that may be occurring. Another test that may be used is to fill the drilled hole quickly with MC-1 or RC-2. If it disappears readily, there is a definite indication of a void under the pavement.

Asphalt Undersealing Recommended

Now is the time for action. If voids are small and slabs do not require much raising, voids can be pumped full of asphalt. Thirty penetration special asphalt, with a melting point of 180° F. is being used in the Eighth Service Command Area. This asphalt will not melt and flow under pavement temperatures. Holes should be drilled on approximately 8-ft. centers, or to fit local conditions. This method is known as "Asphalt Jacking" or "Asphalt Pumping."*

Showing water pocket under slab corner, where "pumping" action under passing wheel loads has developed to an advanced stage

Holes are usually drilled in a pattern of points 3 to 6 ft. each way from a joint intersection



For the correction of the conditions discussed above and for preventing their spread, this method is called "Asphalt Pumping," because there is no desire to raise the slabs, but only to fill the voids as they exist, or we might say, perform preventive maintenance. Holes through the pavement are drilled as true and smooth as possible to facilitate a tight fit of the asphalt injector nozzle. The nozzle is slightly tapered so that it can be driven into the hole to prevent loss of pressure and material.

Pumping Methods Used

The asphalt used in pumping is heated to 400° F. and carried from the distributor pump through a flexible metal reinforced hose to the injector nozzle. Here it enters a three-way cut-off valve rigidly attached to the nozzle which is so arranged that the asphalt can be turned into the nozzle or into a return hose which empties back into the distributor tank. With this arrangement hot asphalt is kept circulating through the hose and valve, and freezing is prevented. Working pressure is variable according to conditions encountered, often building up as high as 45 or 50 lb. when breaking the bond between concrete slab and sub-base. After the bond is broken and the asphalt starts to flow, pressure recedes to between 15 and 35 lb.

The expression "breaking the bond" might raise a question concerning location of voids. It would be very difficult to drill the holes exactly over the voids, so holes are drilled in a fairly uniform pattern, but kept closer to the corners than the center of the slab because voids are predominate at the corners and along the joints where bending or flexure is greatest.

There is no attempt made to confine the asphalt to just entering the voids. It has been found much more successful to just "float" the slab, or allow asphalt to flow under the entire slab. In this way there is assurance that all voids are found and filled. A level rod or "tee board" is kept standing adjacent to the nozzle, and a careful watch is maintained to detect the first upward movement. The rod will indicate a sudden lift as the bond is broken, remain rather stationary until the slab is floated, or the area uniformly covered, then

*See April, 1945 ROADS AND STREETS for article, "Asphalt Subsealing of Pumping Joints," by S. O. Linzell, reviewing asphalt pumping procedures as recommended for highway work.

begin a secondary and steady upward movement. The valve is cut off at this point, and reactive pressures distribute the asphalt concentrated about the nozzle. A permanent lift in excess of ¼ in. is seldom recorded, and is more likely to average below that thickness. Moisture is evaporated or driven ahead of the hot stream of asphalt.

A fairly uniform pattern of holes can be used on unbroken or slightly cracked pavement, say 3 to 6 ft. each way from the joint intersection. If a crack should exist at the selected average offset, move hole back to 20 to 30 in. and if broken segment is large, or has settled appreciably, drill one in the center of it. Drilling judgment will improve by study of pumping results.

Removing Sections for Inspection

Judgment in both drilling and pumping will be greatly improved if a small section of pavement is removed here and there and inspection made as work progresses. It will show how far the asphalt is being pumped, and how completely the base is covered and voids are filled. It will also permit a check of the thickness of the asphalt sheet, whether the slab is just being floated or being raised too much. An occasional test section will pay dividends in numerous ways.

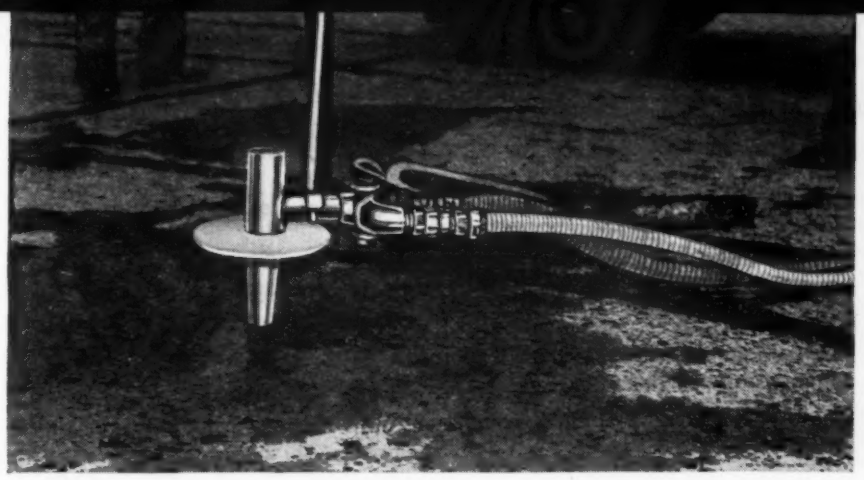
It is interesting to see how the hot liquid has penetrated all small openings and depressions. Removal of a section will show that it has entered the joint from below, which adds extra strength to the water seal just where it is needed most (see page 86). All free water has been vaporized by the intense heat applied and driven out through joints, cracks or forward holes and the subgrade has dried considerably in the process. The asphalt has constructed an effective watertight roof over the base, which, as has been learned the hard way, must be protected from moisture if the pavement is to be kept intact. If the proper grade of asphalt is used, there will never be any melting or shoving.

Test sections of pavement removed at joints which were pumping free water under passing wheel loads immediately before treatment was made, showed that not only was all water driven out, but subgrade was also dried considerably in the process.

Mudjack an Indispensable Tool

Not all airfield pavement failures are due to lack of preventive maintenance. Settlement has sometimes occurred over large areas which is evidenced by the fact that entire slabs go down several inches without breaking. If the settlement is uniform, slight adjustment of slabs can be made to restore an even grade, but with fast moving aircraft, large humps and depressions become mountains and valleys. Some airfields have pavements that have to be raised as much as 4 to 6 in. to reestablish a smooth riding surface. These settlements are clearly due to hasty or faulty construction, but represent a huge investment, and to tear the pavement up, correct the cause of the failure, and replace it would cost in the neighborhood of five dollars a square yard. Jacking with asphalt would not be practicable; the material cost alone would be prohibitive, and an asphalt mat of the required thickness would not be desirable.

These pavements can and are being leveled, however, by use of mudjacks, at an estimated cost of 8 cents per sq. yd. per inch of lift, or an overall aver-



Details of 3-way valve which permits continuous flow of hot asphalt through the lines, by switching flow to a return hose at the instant operator decides that enough underseal has been pumped

The distributor supplying the pumped asphalt being refueled by a second or "booster" distributor while pumping operation is in progress

A typical outfit used for pumping hot asphaltic cement under slabs to subseal points and arrest deterioration

age cost of approximately 20 cents per sq. yd. Mudjack equipment set up is kept as mobile as possible because too much jacking cannot be done at one time through the same hole. The mudjack is a self contained and self powered commercially manufactured unit with a pug mill and water pump integral with the mud pumps. In normal operation the machine will mix and pump 7 to 10 cu. yd. of material per hour, dependent upon the number of moves that must be made.

Great care must be exercised in selecting the soil to be used in mudjacking. It must be free of stones or the pumps and valves will be fouled. If it contains too much sand the sand will separate and settle in the hose between pumps and nozzle, eventually clogging the hose. So a sandy loam, free of stones is used with 19% portland cement added for stability.

Mud Must Be of Proper Consistency

The only difference between mud jacking and asphalt pumping is the material. In mudjacking the material is slower and more viscous, and nozzle must be moved from hole to hole more frequently to prevent bulging and cracking of the slabs. This danger is relieved to a great extent after the pavement starts to lift because the mud spreads with less resistance. Mud must be maintained at a "buttermilk" consistency in order to flow freely. Keep the mixture very thin to begin with, or until the bond is broken and the slab floated. The mixture can then be thickened up a little, but at no time should it be thicker than the consistency mentioned above. Timely or untimely maintenance would not have prevented all conditions leading up to circumstances requiring mudjacking, but most pavement failures could be prevented by proper and timely maintenance.

Joint Sealing Methods

Too much stress cannot be placed on keeping concrete joints sealed at all times. More failures of concrete pavements occur because of unsealed joints than from any other cause. Joints usually open by oxidation of the seal or by shear stress due to flexure of slabs. If caught in time, many joints can be resealed with a light treatment of cutback asphalt, but they must be caught in time; for if dirt and water are allowed to enter and get under the filler, it is too late and filler must be removed and replaced. A maintenance patrol crew with exclusive assignment on airfield pavements should make a continuous program of this type of work. Cleaning and refilling joints would then be a rare necessity. If neglected condition shown in photo page 84 results.

A crew built up on the basis of one man for each 250,000-300,000 sq. yd. of pavement, makes a very efficient and flexible crew. On that basis, the average airfield would have a four or five man crew. Many Army Posts have already organized such crews and would not go back to the old haphazard methods. It has been found that in order to accomplish the necessary work, these crews should be assigned exclusively to preventive maintenance work on airfield pavements.

Correcting Joint Seal Failure

Some asphalt fillers are found to be lying loose in the joints like a piece of rope. It is, in fact, doing more harm than good. The water will go by it into the joint, yet since evaporation is slowed or stopped, time is allowed for water to seep through, slowly at first but faster as the action continues until finally the joint becomes a regular channel. There is only one thing left to do when this occurs—clean out the joint and reseal it.

Expansion joints are cleaned down to the filler pad, and flexplane or construction joints to the maximum possible depth. Open cracks, though they cannot be plowed, are also cleaned to maximum possible depth. For the joints several types of gouge plows have been constructed at various stations which are basically the same. Any rigid skid with replaceable and adjustable square-tip gouge tooth serves the purpose. Several teeth of proper width to fit the various joints are needed.

After plowing and scraping, a jet of compressed air will remove all loose dust and debris. A "tack" coat of RC-2 cutback asphalt diluted with kerosene or white gasoline to the consistency of paint should then be applied. An emulsified asphalt also makes a good tack coat, especially when walls of joint are damp. A well applied tack coat need only be paint thick—its utility and worth will be realized in a longer life of the sealing compound.

It has been found through experience that higher penetration asphalts (85 to 100) will keep a joint sealed far longer than the low penetration asphalts previously used. Commercial hot-poured rubber joint sealing compounds are more efficient and longer lived when properly applied, but are also more expensive.

Costs Averaged $0.20 per Sq. Yd.

Asphalt has been pumped under rigid pavement in this territory by contract at unit prices which average approximately $0.25 per hole drilled (which included refilling the hole) and $0.15 per gal. for asphalt in place. The same work has been done by the Headquarters Maintenance Crew at slightly less cost. On eight airfields where major jobs were completed by this crew a total of 201,794 sq. yd. of rigid pavement was treated at unit prices averaging $0.22 per sq. yd. and $0.12 per gal. The cost of the work done by Government forces includes plant rental which was arrived at by dividing A.G.C. rates by 1.11 to allow for taxes, insurance and interest, than by dividing the monthly rate thus derived by 20 days to determine the daily rate. Government labor costs were increased by 56% which was entered as "Lost Time," and itemized as travel time, sick leave, time lost on account of weather, etc. Per diem which was paid to each employee at the rate of $6.00 was raised 44%, or to $8.65, so that travel time and Sundays esti-

After subsealing a test area and removal of section for inspection. Resulting under layer of asphalt being peeled back for a check on the moisture remaining in the subgrade

mated at 112 days per year, in which per diem was payable would be charged to the projects. Transportation expenses were also charged by adding 10% to the total labor cost of the crew.

The cost of preventive maintenance on airfield pavements in the Eighth Service Command area currently averages less than 1½ cents per sq. yd. per year, and seldom exceeds 2 cents. Replacement costs are upward of $5.00 per sq. yd. Poorly maintained pavements will fail in from two to five years under maximum loading, but the life of a well constructed and well maintained pavement is unknown so long as the design load is not exceeded. Overloading will cause premature failures, but proper preventive maintenance will prove to be an investment worth many times its cost, even on overloaded pavements.

In conclusion, there is no substitute for a prompt, intelligent and efficient preventive maintenance program.

Acknowledgments

The foregoing summary is based on facts and experiences compiled in a motion picture presentation through the private initiative of personnel of the Maintenance and Repair Branch, Headquarters Eighth Service Command, ASF, Dallas Texas; Lewis Dodson, Major, Corps of Engineers, Chief of Branch. The picture was filmed by C. M. Bell, Engineer, for the Roads Runways and Railroads Section, with the technical assistance of C. C. Todd, Chief of Section, J. L. Duncan, assistant, and M. G. Fuller, Service Engineer.

One form of plow successful in speeding up removal of old concrete joint material in resealing. Usually towed by a truck

Handy outfit for rapid application of hot seal

Pennsylvania Treating 4900 Miles This Year

FOLLOWING are the essential facts covering the 1945 Surface Treatment program of the Pennsylvania Department of Highways as supplied by John L. Herber, Chief Engineer:

Mileage Treated or to be

Treated	4,666
Estimated Gallonage of Oil	17,361,500
Estimated Cost	$4,403,000

Approximately 90% of this program consists of a light surface treatment using from 0.25 to 0.40 gal. per sq. yd. of oil and from 20 to 30 lb. per sq. yd. of covering material. The remaining 10% provides for a heavy drag treatment of from 0.65 to 0.85 gal. of oil and from 55 to 60 lb. of covering material per sq. yd. This latter application is used generally on heavily traveled roads which have become rough and slightly corrugated under traffic.

In addition to our regular surface treatment program, this department expects to complete during 1945 an extensive program of flexible type surface maintenance consisting of an application of 1.00 gal. of oil and 90 lb. of covering material per square yard. This is known as our Specification AT-1 bituminous surface course providing a surface approximately 1 in. in depth. Specification AT-1 program will involve the following mileage, quantities and estimated costs:

Milage, 246; gal. of oil, 2,242,000; estimated cost, $788,200.

Our surface treatment and specification AT-1 programs were started during the latter part of April or the early part of May and we expect both programs, involving the application of approximately 19,613,500 gal. of oil to be completed by October 15, 1945.

State Highway Officials Specify and Insist on

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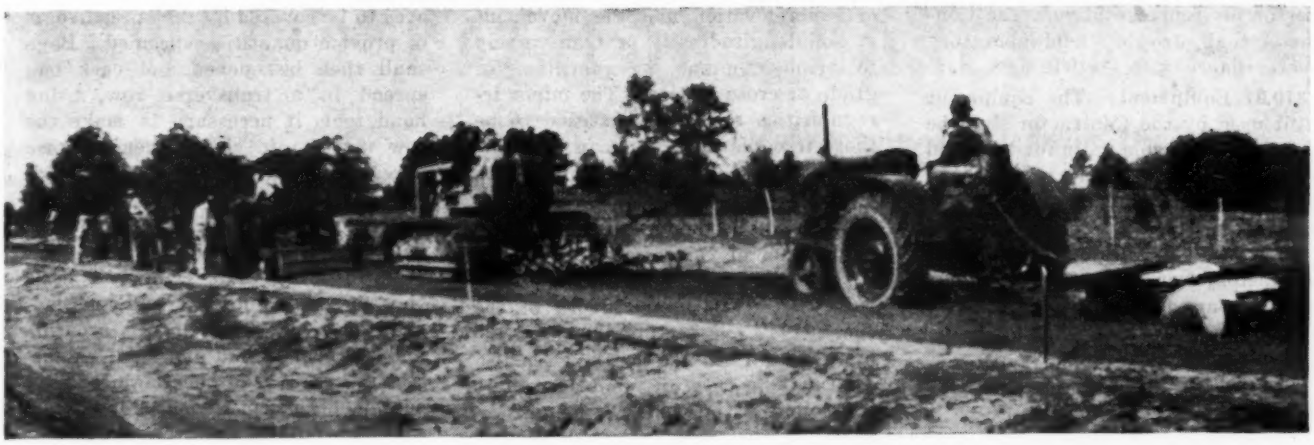

Soil-Cement: Typical "Specs"

Herewith are presented Alabama's specifications, which are among several state specifications which reflect latest practice in this low cost road type. Alabama, like other states, is planning extensive light-traffic or farm-to-market road construction using bituminous stabilization, soil cement base or other surface types as local conditions and cost comparisons suggest. Of special interest to county and other local officials.

The following standard specifications for Soil-Cement Base Course are as amended and issued under date of April 23, 1945, by the Alabama State highway department.

(Specifications to be presented in article form beginning with 310.01 on page 1.)

Description and General Procedure

301.01 Description: Soil Cement Base Course shall consist of a foundation course for a surface course or pavement, composed of a combination of roadbed or imported soil and portland cement intimately and uniformly mixed, moistened and compacted in accordance with these Specifications, and shaped to conform to the lines, grades, thicknesses, and typical cross-sections shown on the Plans. Construction shall proceed as follows:

(a) The soil to be processed shall be pulverized for the required depth as measured from grade stakes, and for the full width to be treated with cement.

(b) Portland cement shall be uniformly spread and intimately mixed with the pulverized soil.

(c) Water shall be added as needed with a pressure distributor and shall be uniformly incorporated in the mixture in the amounts required to attain the optimum moisture content for the soil-cement mixture. This operation may be done by mixed-in-place methods as herein set forth or by approved mixing machines designed for the purpose.

(d) The mixture shall be compacted uniformly with sheepsfoot rollers in one continuous operation from the bottom of treatment to the surface. The mixture shall be compacted at optimum moisture content and to within 5 pounds of maximum theoretical density for the soil-cement mixture.

(e) After compaction is completed with the sheepsfoot rollers, the surface shall be shaped, water added as needed, and further compacted and finished with a smooth-wheeled roller supplemented by spike-tooth harrows, nail drags, broom drags and by pneumatic-tire rolling until a uniform, smooth, closely knit surface finish conforming to lines and grades shown on the plans has been accomplished.

(f) The Prime Coat provided as a part of bituminous wearing surfaces shall be applied to the green base course to serve as a moisture retaining membrane for curing the base course.

The equipment used shall be in suitable operating condition to obtain the required finished Soil-Cement Base Course which shall be constructed in accordance with these Specifications.

When it is deemed necessary to incorporate into the mixture, granular or other materials not occurring in the roadbed, it will be so indicated on the plans and items for separate payment for such material will be provided.

Materials

310.02 Portland Cement: Portland cement shall be of a standard brand, and shall conform to the requirements and tests of Section 508, Article 508.04, Cements. One cubic foot of Portland cement shall be considered as weighing ninety-four pounds. The Contractor, at his option, may use bulk cement, provided the apparatus for handling, weighing and spreading the cement is accurate to within 0.5% of the specified amount of cement to be spread.

310.03 Water: The water used in the construction of this base course shall meet the requirements of Section 508, Article 508.08, Water.

310.04 Soil: The soil for this base course shall consist of the material in the roadbed, a mixture of this material with appropriate added material or selected soil approved by the Engineer. It shall be pulverized and free of humus, roots, sods, and weeds and stones of greater dimension than 3".

310.05 Prime Coat: Prime Coat, provided as a part of various bituminous wearing courses, is not a part of Soil Cement Base Course, but shall be applied while the base course is green to serve as a moisture retaining membrane during the base course curing period. The kind of bituminous material required and its rate of application when so used are hereby modified. Emulsified Asphalt, Grade EA-5 of the consistency ordered by the Engineer shall be used at the rate provided elsewhere herein. The coefficient of expansion of such material is hereby fixed at 0.00025 per degree F.

Construction Methods

310.06 General: Every reasonable facility shall be provided to the Engineer for the inspection of materials and processes. No soil-cement base course material shall be mixed without suitable supervision of the Engi-

neer or his representative. The Contractor shall provide a field laboratory in accordance with Article 5.08.

310.07 Equipment: The equipment outfit used by the Contractor shall be made up of suitable units for balanced operation and sufficient in size and number to perform efficiently at the rate of progress required for the work. Without prejudice to other satisfactory working units, the following items are proposed:

(a) Motor graders with scarifier and 12-ft. blade (tandem or 4-wheel drive preferred).
(b) Disc harrows, with discs 22-in. minimum diameter.
(c) 4-bottom, 14-in. mold board plows.
(d) 6 ft., or larger, rotary tiller or similar mixers.
(e) Tractors, both crawler and rubber-tired.
(f) 8 ft., heavy duty spring-tooth cultivators, equipped with 4 in., shovels.
(g) 800 gal. or larger bituminous distributors.
(h) 800 gal. or larger feeder tanks.
(i) 800 gal. or larger pressure water distributors.
(j) Multi-drum sheepsfoot rollers with arrangement for varying range of foot pressure.
(k) Pneumatic tire rollers equipment for varying rates of pressure.
(l) Tandem self propelled smooth wheeled rollers of a weight 3 to 10 tons as dictated by soil types and conditions.
(m) 10 ft., spike tooth harrow, teeth not more than 1½ in. apart.
(n) Broom drags.
(o) Nail drags.
(p) Travel Plants or mixing machines designed for this purpose.

310.08 Preparation of Existing Roadbed: Before undertaking other construction operations, the existing roadway shall be shaped to conform with the grades, lines and cross-section required for the completed roadway. Sprinkling and moistening the roadbed prior to scarifying will be permitted. Any additional soil needed shall be placed, and any unsuitable soil or material, including material retained on a 3-in. screen, shall be removed and replaced with material acceptable for soil-cement processing.

Should it be necessary to add soil to roadbed or to remove unsatisfactory soil from the roadbed, these operations will be set up and paid for as separate items in the contract.

Shaping shall be considered to include removal of excessive crown, blading to secure the required crown or superelevation and the movement of soil longitudinally or transversely to remove minor irregularities of grade or cross-section. The minor irregularities shall be construed to be those irregularities that can be logically corrected by shifting of dirt with a blade.

310.09 Pulverizing: Prior to the application of cement, the soil to be treated shall be scarified and pulverized to the width and depth of the compacted cross-section shown on the plans. The width and depth of scarifying shall be carefully and accurately controlled. The construction procedure of these operations shall be such as to provide the following:

The edge of the scarified section shall be formed with a turn-plow, or other tool capable of cutting accurately to line and depth of edge of base as shown on typical section. No scarifying shall be done outside of these lines. The depth of scarifying shall be carefully controlled so that the maximum depth scarified shall not exceed the compacted depth shown on typical section and the minimum depth shall be within 0.5 in. of compacted depth shown on typical section. The final cutting shall be by grader blade, the general intent being a planed subgrade without ridges.

During the scarifying and pulverizing operation the scarified material shall be pulled away from the outside edges to form a furrow along the edge. This furrow shall be the full depth of the base to be stabilized and shall be wide enough to leave exposed the full depth of shoulder and shall be maintained throughout this operation.

Pulverizing shall continue until 80% of the soil by dry weight, exclusive of gravel or stone, shall pass a No. 4 sieve, and the soil shall be manipulated until the percentage of moisture in the soil does not exceed by more than 2 the percentage of moisture needed to attain the optimum moisture for the soil-cement mixture before compaction. The length of roadway scarified and pulverized at any time shall not exceed the length which can be completed in accordance with this specification in 2 working days.

310.10 Application of Cement: The pulverized soil shall be shaped to the approximate cross-section shown on the Plans and the quantity of portland cement specified or ordered by the Engineer for the full depth of treatment shall be uniformly spread over the surface in one operation. The cement content will vary with different types of soils. In order to provide a uniform spread, cement in bags shall be spaced accurately along area to be covered by the spread so as to provide quantities specified. Bags shall then be opened and each bag spread in a transverse row, using hand tools if necessary to make the row uniform in size. Then uniform spreading shall be completed longitudinally by use of hand rakes followed by repeated trips of approved spike tooth harrows.

In the event bulk cement is used, the spreading devices and methods shall be such as to insure accurate and uniform spread and shall be subject to approval of the Engineer. No equipment, except that used in spreading and mixing, will be allowed to pass over the freshly spread cement until it is mixed with the soil.

310.11 Mixing: Immediately after the cement has been distributed it shall be mixed with the loose soil for the full depth of treatment. Care must be exercised that no cement is mixed below the desired depth. Mixing may be accomplished with field cultivators, gang plows, disc harrows, rotary tillers or other implements and shall be continued for as long a period of time and repeated as often as may be required to insure a thorough uniform and intimate mix of the soil and cement and until the resulting mixture is homogeneous and uniform in appearance.

In this mixing operation, rotary tillers or disc harrows shall be used first to mix the cement as deep as practical with the loosened soil before any turning, as with gang plows, is done. The mixture shall then be shifted and shaped to the approximate lines and grades shown on the Plans.

310.12 Application of Water: Immediately after mixing of soil and cement is complete, the moisture content of the soil-cement mixture shall be determined and, if required, water shall be uniformly applied in such quantities and at such a rate as to obtain the desired optimum moisture for the mixture. Water supply and pressure-distributing equipment shall be provided which will permit the continuous application of all water required on the section of roadway being processed within three hours.

Each application or increment of water shall be partially incorporated by field cultivators, gang plows, disc harrows, rotary tillers or other implements so as to avoid concentration of water near the surface or flow over the surface. After the last increment of water has been added, mixing shall be continued by using field cultivators, gang plows, disc harrows, rotary tillers or other implements. This equipment outfit shall be of sufficient size and capacity to distribute the moisture uniformly throughout the full depth of the mixture in one operation.

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"Best Ever" Sums up the gist of the comments from the users of the 1945 edition of Powers' Road & Street Catalog

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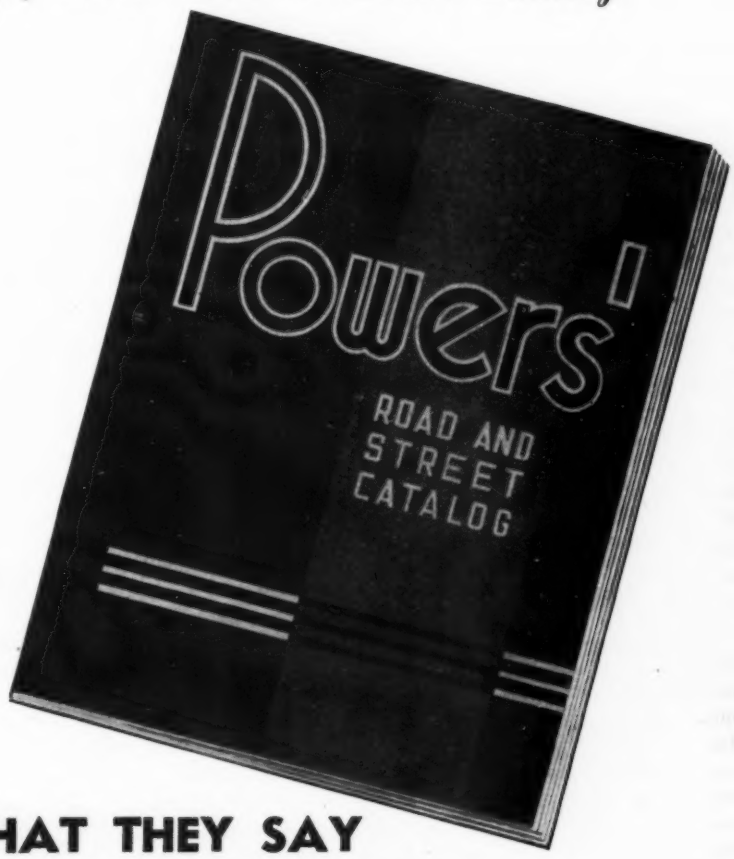

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Particular care shall be exercised to insure satisfactory moisture distribution along the edges of the section.

When water spreading and mixing is completed, the percentage of moisture in the mixture and in unpulverized soil lumps, on a basis of dry weight, shall not vary from the specified optimum moisture content of the soil-cement mixture by more than one-tenth for mixtures consisting of soils of the A-1, A-2 or A-3 P.R.A. soil groups, having less than 30% aggregate retained on the No. 4 sieve.

With soils of A-4 or higher classification and with soils containing 30% or more of plus No. 4 aggregate, the percentage of moisture in the soil-cement mixture and in unpulverized soil lumps shall not be below the specified optimum moisture nor more than one-fifth above the specified optimum moisture. This specified optimum moisture shall be that prevailing in the moist soil-cement at the time of compaction and shall be determined in the field by a moisture-density test, A.S.T.M., Desig.: D558-40T on representative samples of soil-cement mixture obtained from the roadway toward the conclusion of moist mixing operations.

310.13 Compaction: Prior to the beginning of compaction, and as a continuation of mixing operations, the mixture shall be thoroughly loosened for its full depth and uniformly spread, including filling furrows at the edges. It shall then be uniformly compacted with a sheepsfoot roller beginning at the bottom and continuing until the entire depth of soil-cement mixture is uniformly compacted within 5 lb. per cu. ft. of the specified maximum density of the soil-cement mixture. This specified density shall be the maximum for the moist soil-cement at the time of compaction and shall be determined in the field by a moisture-density test, A.S.T.M., Designation: D558-40T, on representative samples of soil-cement mixture obtained from the roadway toward the conclusion of moist mixing operations.

The sheepsfoot roller shall be of the size, shape and weight specified in Section 212, Article 212.01, adjusted to give the required densities in the soil-cement mixture being compacted. The rate of operation and number of rollers shall be sufficient to compact uniformly the section of roadway being processed for the specified width and depth within two hours.

After the mixture, excepting the top one inch of mulch, is compacted, the surface of the treated roadway shall be moistened and reshaped to the required lines, grades and cross-section and then shall be lightly scarified to loosen any imprints left by the compacting or shaping equipment, until a uniform, even surface mulch of not more than one inch in thickness is obtained that contains the specified optimum moisture. The resulting surface then shall be thoroughly rolled with smooth-wheel tandem rollers of approved weight and with pneumatic-tire rollers both meeting state compaction requirements.

The rolling shall be supplemented with the use of nail drags and broom drags. Surface finishing methods may be varied from this procedure provided a dense, uniform surface, free of surface compaction planes is produced. The moisture content of the surface material must be maintained at its specified optimum during all finishing operations.

The surface compaction and finishing shall be done in such a manner as to produce, in not over two hours, a smooth, closely-knit surface, free of cracks, ridges or loose material, conforming to the crown, grade and line shown on the Plans.

If and when one size sand or soils containing little or no natural binder are being processed, the compacting and surface finishing equipment and methods may be varied from the above outlined procedure, in order that the required densities and a uniform surface may be obtained.

310.14 Protection & Cover: After the roadway has been finished as specified herein, it shall be protected against rapid drying for a period of seven (7) days by applying a Prime Coat as provided next below.

Any finished portion of the roadway adjacent to construction which is used as a turn-around area by equipment in constructing an adjoining section shall be continuously covered with at least 6 in. of earth to prevent equipment from marring the surface of the completed work. At the time of final finishing of the adjoining section, this cover shall be moved sufficiently to permit making a smooth riding joint with the new section.

310.15 Prime Coat: After final rolling and finishing of the base course are completed but before the end of the same day, a prime coat of emulsified asphalt (Grade EA-5) shall be applied to the surface of the base course at a uniform rate of 0.20 to 0.23 gal. per sq. yd., excepting requirements for cleaning and sweeping for prime coat. Seasonal and weather limitations shall be as specified in Article 310.18. Alternate use of the distributor, required for applying Prime Coat, for application of water will be permitted.

Payment for prime coat will not be made separately. It is, and shall remain, a part of bituminous surface course pay items.

310.16 Alternate Method of Construction: Machines or a combination of machines which will meet these specifications for pulverizing the soil, spreading cement and water, mixing the materials, or compacting and finishing the mixture may be used in lieu of the method specified herein. Any machines used shall be provided with means for visibly and accurately gaging the water applications in gal. per sq. yd.

In case the machines do not produce a uniform, homogeneous mixture of soil-cement, their use shall be discontinued unless a suitable mixture can be obtained by supplementary mixing with field cultivators, gang plows and other suitable equipmnt. When such machines are used, precaution must be exercised to obtain the specified depth and straight longitudinal edges conforming to the crown and grade specified on the Plans with all materials adjacent to the edges compacted to the same density as the remainder of the roadway.

When the machines will handle only part of the roadway width, they shall work forward with successive increments so the roadway may be compacted and finished for full width as one operation. In any event, when machine mixing is used, the resulting soil-cement mixture shall be compacted at the optimium moisture content before there is any appreciable moisture loss and the compaction operation shall be a continuation of the mixing operation in such manner that the moistened soil-cement mixture does not remain undisturbed after mixing and before compacting for more than 30 minutes.

310.17 Construction Limitations: Cement shall be applied only to such an area that all the operations specified in Articles 310.10 to 310.13, inclusive, can be continuous, and all but final surface finish completed within 6 hours after the beginning of water applications to the thoroughly mixed soil-cement. No cement shall be applied to the loose soil unless the Subgrade immediately beneath will support without displacement the compaction hereinafter specified, or when the percentage of moisture in the soil in the Subgrade immediately beneath the pulverized material exceeds the optimum moisture for that particular soil or when the percentage of moisture in the pulverized soil exceeds the optimum moisture of soil-cement mixture by more than two.

When any of the operations after the start of the application of water is interrupted continuously for more than 30 min. for any reason, or when the uncompacted soil-cement mixture

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is wetted by rain so that the average moisture content exceeds the tolerance given in Article 310.12, the entire section shall be reconstructed in accordance with these Specifications. Additional payment will be allowed only for the additional cement necessarily used, when such reconstruction is due to rain.

310.18 Weather Limitations: During seasons of probable freezing temperatures, no cement shall be applied unless the air temperature is at least 40 deg. F. in the shade and rising. Work shall not proceed when the subgrade is frozen or the soil contains frozen lumps.

310.19 Opening to Traffic: The Contractor will not be permitted to drive heavy equipment over completed portions prior to "opening to traffic" except pneumatic-tired equipment required for constructing adjoining sections may be driven over the surface of the completed portion provided it has hardened sufficiently to prevent the equipment from marring the surface, and provided protection and cover specified in Article 310.14 are not impaired. Complete portions may be opened to traffic after the seven days' protection specified in Article 310.14, provided the surface has hardened sufficiently to prevent marring by traffic.

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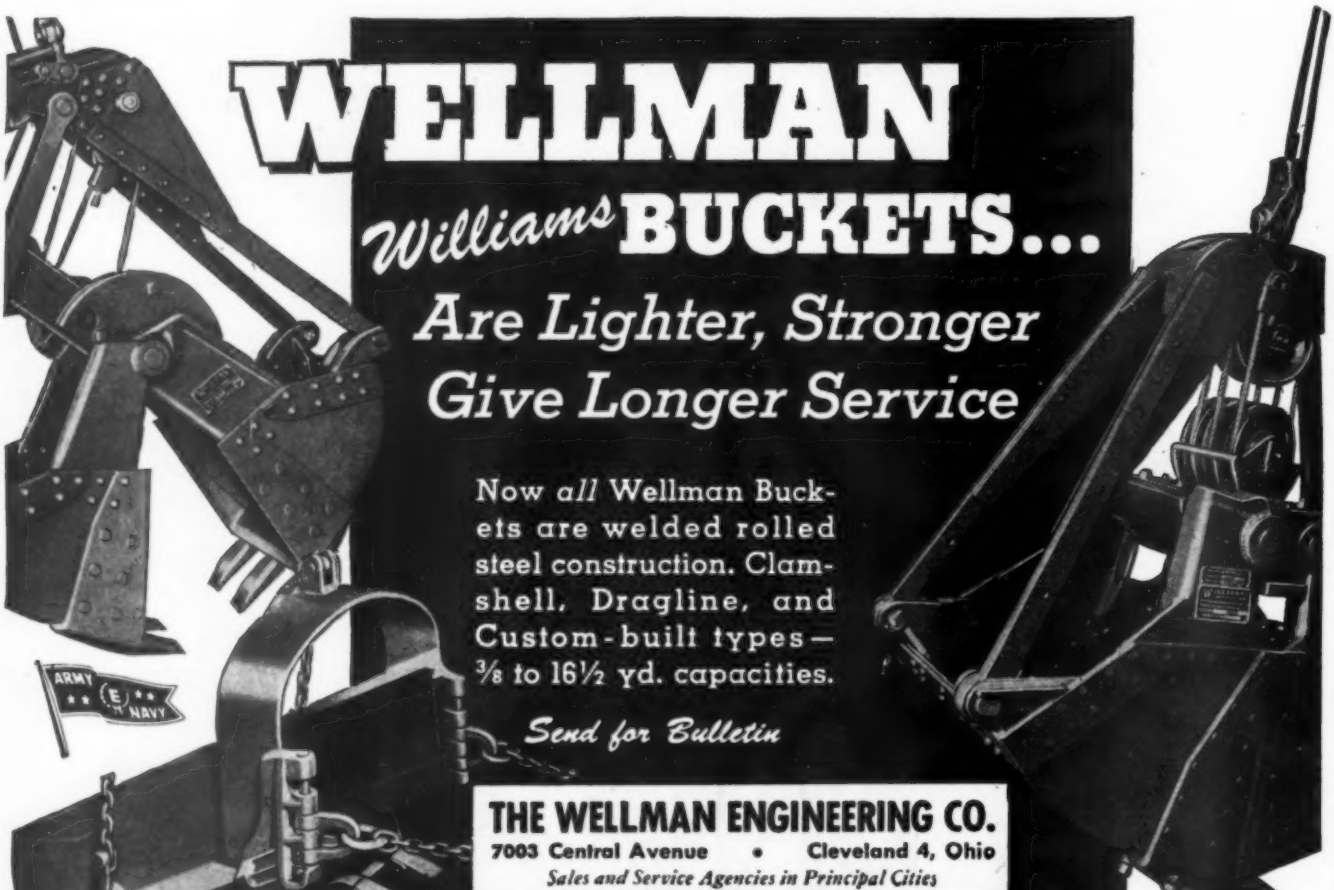

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310.20 Maintenance and Traffic Protection: The Contractor shall be required to maintain at his own expense the entire Roadway within the limits of his contract in satisfactory condition from the time he first starts work until all work shall have been completed. Maintenance shall include immediate repairs of any defects that may occur either before or after the cement is applied, which work shall be done by the Contractor at his own expense and repeated as often as may be necessary to keep the Roadbed continuously intact. Repairs are to be made in a manner to insure restoration of a uniform surface and durability of the part repaired.

Any low areas will be remedied by replacing the material for the full depth of treatment rather than adding a thin layer of soil-cement to the completed work. Damage to shoulders, slopes and ditches, caused by turning equipment or other operations shall be restored by the Contractor as maintenance.

The Contractor shall provide traffic protection as specified, together with the necessary watchman and flagman.

Compensation

310.21 Method of Measurement: The accepted yardage shall be the number of square yards of Soil-Cement Base Course, completed to the thickness, density and cement content required and accepted and measured in place. The length used to determine this yardage shall be the length secured by measuring along the riding surface. The width used shall be the width of base course designated on the Plans, except when this width has been changed in writing by the Engineer, in which case the widths as directed shall be used. No additional payment will be made for materials or Base Course placed outside established limits or in excess of amounts specified or ordered in writing by the Engineer.

The density of the soil-cement base course will be determined after each day's construction. Any portion which has a density of more than 5 lb. per cu. ft. below that specified as maximum density for the soil-cement mixture, shall be removed and replaced to meet these Specifications.

The thickness of the soil-cement base course will be determined from thickness measurements at holes drilled in the finished base course at intervals not to exceed 500 ft. The average thickness of base course constructed during one day shall be within ½ in. of the thickness shown on the Plans, except that the thickness at any one place may be within ¾ in. of that shown on the Plans. Where the average thickness shown by the measurements made in one day's construction is not within the tolerances given above, the Contractor will be required to reconstruct this day's work at his own expense. Payment will not be allowed for cement used in repairs and reconstruction.

The cement content of the Soil-Cement Base Course, specified on the Plans or in the Proposal or ordered in writing by the Engineer, shall be expressed in percentage of the compacted volume of the base course, which volume shall be computed from the accepted yardage as defined above, and the thickness shown on the Plans. The increase or decrease in cement used shall be the difference in barrels between the quantity computed at the rate specified on the Plans or in the Proposal and the quantity actually used in accordance with written instructions of the Engineer. No such allowance will be made for cement wasted or used in repairing defective work or in reconstructing rejected work. Allowance will be made for the additional cement used in reworking areas as directed due to rains.

310.22 Basis of Payment: The accepted yardage of Soil-Cement Base Course, as defined above, will be paid for at the Contract Unit Price per square yard complete in place as shown on the Plans or in the Proposal; which Contract Unit Prices shall be full payment for furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work and for carrying out the maintenance provisions in these Specifications.

Payment for the increase or deduction for the decrease in the total quantity of cement actually used by written instructions of the Engineer, determined as provided above, shall be made at the Contract Unit Price per barrel, which Contract Unit Price shall cover in full furnishing, handling and all processing of cement, used or not used, in varying the cement content of the Soil-Cement Base Course.

Payment or Deduction will be made under: Item No. 310-A—Soil-Cement Base Course (Cement Content ——% by Volume)—per square yard; Item No. 310-B—Cement Furnished (For Varying the Cement Content)—per barrel.

▼

Sixty-one Michigan counties now maintain state trunkline highways within their borders under contract with the state highway department.

Highway Research Board to Expand

The work of the Highway Research Board is being enlarged to provide a greatly expanded highway research correlation service. The stated objectives of this service are: to collect the available information concerning past, current and proposed research work relating to highways and highway transportation, of the Federal Government, State highway departments, colleges and universities and other research agencies; to study and correlate the information by means of individual and group conferences and committee activities; to prepare reports and make recommendations based thereon; and to disseminate such information, reports, and recommendations among the highway research agencies, to the end that they may be fully and promptly informed concerning research activities and that a coordinated program of highway research may be planned and carried out and thus avoid undesirable and unnecessary duplication of effort and secure greater economy and efficiency in the expenditure of public funds for research activities.

The correlation service will be in the immediate charge of Fred Burgraf, Associate Director, under the general supervision of Roy W. Crum, Director.

▼

Major J. A. Long Rejoins ARBA

Major J. A. Long

Major John A. Long, after three years of military service, has resumed his duties at the American Road Builders' Association in Washington, as head of the County Highway Officials and Municipal Highway Officials Divisions. Major Long held this position for four years before the war. Previously, for two decades he held an engineering post with the highway departments of Mississippi and Florida and with Lee and Duval Counties in Florida.

▼

Nashville has started work on a million-dollar project to connect 1.3 miles of Lafayette St. into a 4-lane divided boulevard. About half the cost will be for land. Wm. F. Bowe, Jr., of Augusta, Ga., has the contract. Warren A. Collidge, director of public works.

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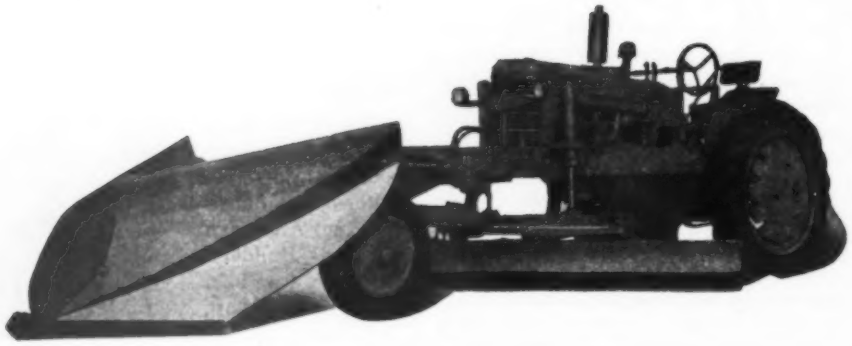

Frank Wyse Is Dead

F. O. Wyse

Francis O. Wyse, 48, for 19 years publicity manager of Bucyrus-Erie Co., South Milwaukee, Wis., died recently, in Columbia Hospital, Milwaukee, following an illness of almost 14 months. Born in Salem, Mass., May 4, 1897, Frank Wyse spent the early years of his life in Toronto, Ont. Following an educational interruption for service in the U. S. Navy, he was graduated from Massachusetts Institute of Technology in 1919 with a degree in mechanical engineering. He later joined the Blanchard Machine Co., Cambridge, Mass., from which position he came to Bucyrus-Erie Co. in 1924. In 1926 he took over the management of the publicity department. He was widely recognized as an industrial advertising leader, serving as Secretary-Treasurer and Vice-President before being elected President of the National Industrial Advertisers Association in 1937. He also served as President of the Milwaukee Association of Industrial Advertisers in 1932-33.

▼

Promotions in Missouri State Highway Department

P. H. Daniells, formerly engineer of surveys and plans, has been promoted to assistant chief engineer of the Missouri State Highway Department. C. P. Owens, who has been with the department for over 25 years, takes over Mr. Daniells' former position. Fred D. Harris, formerly division engineer for Division 10 at Sikeston, Mo., has been promoted to head the supplementary roads department in the main office at Jefferson City, Mo. M. S. Gwinn, heretofore acting manager of highway planning succeeds Mr. Harris as division engineer.

▲

"User Charges" for Highway Carriers—President Pelley of Association of American Railroads has urged that "user charges" be levied against highway, waterway and airway carriers. He argued that a change of that nature is needed to put competitors on "same basis" as railroads which provide their own rights-of-way and pay taxes on them.

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Hot-Mix Asphaltic Concrete Paving Manual

A manual on "Hot-Mix Asphaltic Concrete Paving" has been published by The Asphalt Institute.

In this manual there is published for the first time a complete text on the design of hot-mix asphaltic concrete paving and how any particular job mix is set up. Its four subdivisions are entitled:

Part I — Recommended Thickness Requirements for Hot-Mix Asphaltic Concrete Paving.

Part II — Specification A-2-a Hot-Mix, Hot-Laid, Asphaltic Concrete Paving (Dense-Graded Aggregate Type). Methods of testing mixtures. Job and plant-mix formulas.

Part III—Specification A-2-b Hot-Mix, Hot-Laid, Asphaltic Concrete Paving (Graded Aggregate Type). Methods of testing mixtures. Job and plant-mix formulas.

Part IV — Inspection of Hot-Mix Asphaltic Concrete Paving.

Specifications A-2-a and A-2-b are alternates and supersede former Asphalt Institute Specification A-2 for Asphaltic Concrete Surface Course (Coarse-Graded Aggregate Type) and Specification B-8 for Asphaltic Concrete Base (Coarse-Graded Aggregate Type).

Single copies of the manual and these separate parts are available to officials, engineers, technologists and the industry, without charge, upon request either to this Magazine, The Asphalt Institute, 801 Second Avenue, New York 17, N. Y., or other Institute offices.

▼

Connecticut Has Long-Service Employees

Addressing more than 200 Connecticut Highway Department employees and officials, Governor Baldwin recently congratulated 18 persons associated with the department for more than 30 years each and some 130 other persons connected longer than 25 years.

Guests of honor at the ceremonies, at which the Governor presented a 50-year placque to Commissioner Cox and the Highway Department, were Clinton G. Nichols, former deputy commissioner, who retired in 1941 after 35 years service in the department; George Hamlin, also a former deputy commissioner, who retired in 1930 after 30 years; Elmer C. Welden, retired in 1941 after 31 years; and Judge George E. Hinman, chairman of the former Highway Advisory Commission.

Departmental associates with more than 30 years' service apiece were A. W. Bushell, Julia D. Conway, James Craig, Maurice Cushman, Florence Howard, W. E. Hulse, Fred H. Johnson, Walter M. Jones, Edward S. Lawler, Chester A. Nolan, Joseph Nucci, G. E. Okerfelt, John Smith, Walter A. Spencer, Joseph Stassolo, Charles F. Taylor, Peter L. Thomson and Olin Wilson.

▼

The Drainage of Airports

"The Drainage of Airports" by W. W. Horner, Engineering Experiment Station, circular series No. 49, University of Illinois, Urbana, price 50c. Based on a lecture by Mr. Horner, Consulting Engineer of St. Louis, to the engineering students, this 48-page bulletin contains complete and valuable data, and many tables on subsurface and surface drainage, with case examples.

▼

Joins National Highway Users Conference—Louis E. Mesam, after three years of public relations work with the Army Service Forces, has joined the National Highway Users Conference, Washington, D. C., as public information director.

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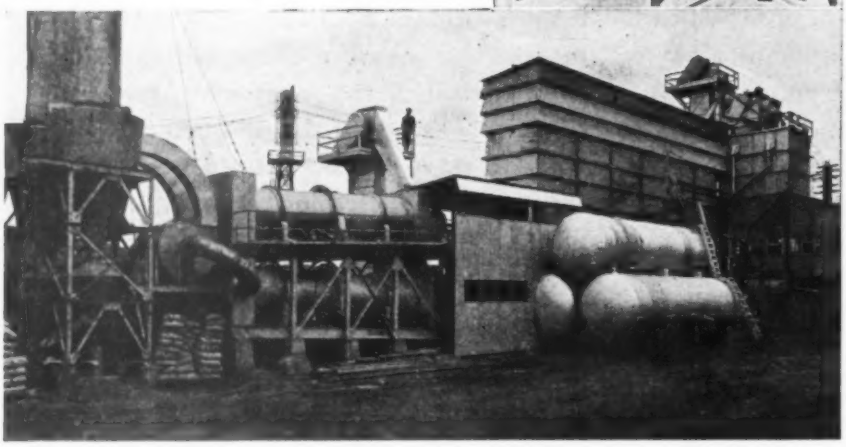

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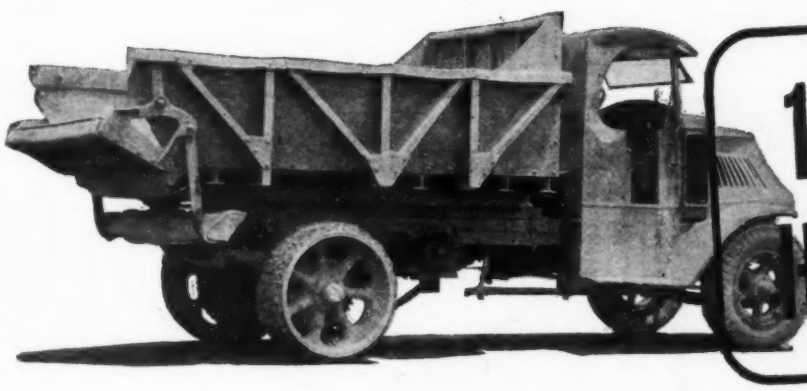

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Poor Road Conditions Boost Snow Removal Costs

By E. J. MATTIS
Supt. of Highways, St. Lawrence County, Massena, New York

A PROBLEM which affects snow removal not only this year but every year in all of the country where heavy snowfall occurs, is the poor condition of many roads which makes them unfit for economic snow removal. Most of them are too narrow and have deep ditches close to the roadway with steep slopes. Others have the highway margins covered with boulders, stumps and trees and often grown up to brush which makes a good snow fence but deposits the snow directly in the roadway. Thousands of miles have the grade too low and generally have some kind of shallow cut near the hilltops with abrupt back slopes providing a combination which is ideal for excessive drifting. Heavy equipment is naturally needed to open these roads, but the roadbed is not suitable for its safe operation. To try to remove snow on those roads in their present condition is like fighting nature and ourselves combined, and it appears sometimes useless.

While we have heard talk for a long time about having plans ready for highway construction on short notice, it is my opinion that not too many of these plans are really ready and that the starting of contracts which is always slow, will be delayed for some time. The state and other highway agencies could do nothing better than to rehabilitate hundreds of miles of these roads which are cluttered along their margins with obstructions of every nature, which have practically no shoulders, and where the ditches, instead of being drainage features, amount to dangerous traps for the traveling public and snow removal equipment. This work could be done with their own forces, could be started on short notice and would offer employment to great numbers. The design of all future highways should include the whole roadway and not the pavement alone, and should provide for economical snow removal in the places where snow is a problem. Their elimination or correction is necessary if snow removal is to be provided at a cost which can be borne.

Heavy displacement plows, V-type and one-way, with hydraulically operated wings are preferred in this area. Modern type power graders are becoming of more value.

Another subject needing attention in New York is local road plowing costs. It is not possible for anyone to give the cost of snow removal by the towns which own their own equipment in this state unless an accurate record of the time which the equipment is used is kept and a proper rental rate assigned. The reason for this is that the equipment for the towns is purchased through the Machinery Fund. The Miscellaneous Fund contains a subdivision for snow

.. (*Continued on page* 113)

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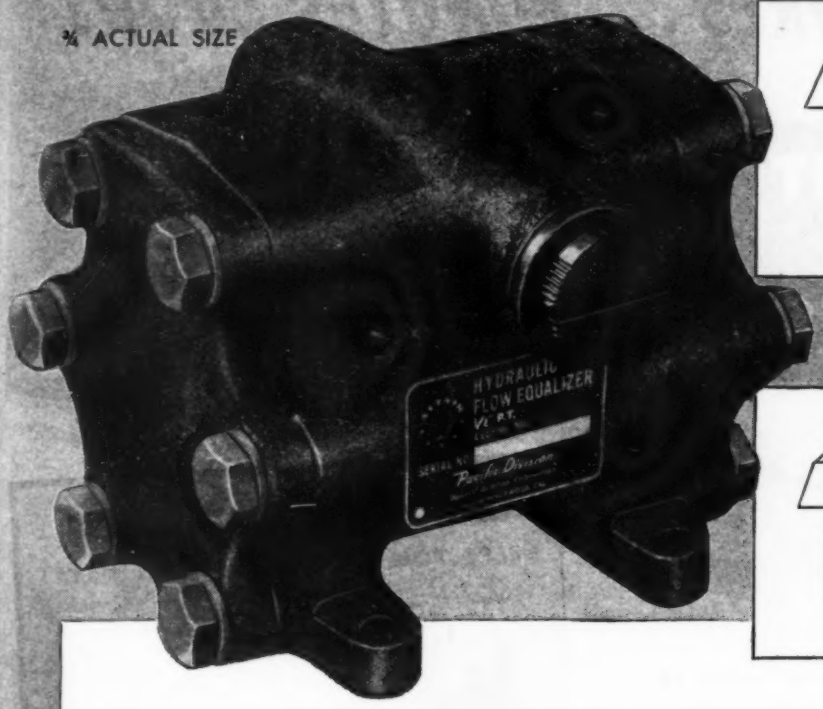
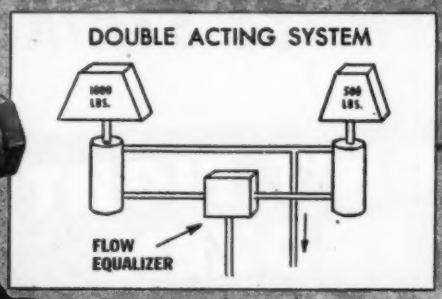
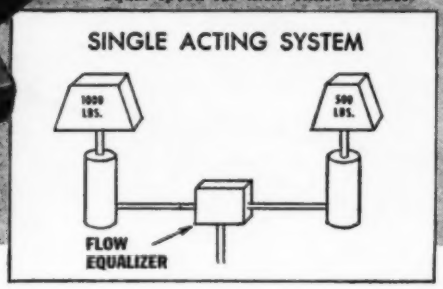




Irrespective of wide differentials in loads or restriction the Bendix Equalizer synchronizes action in *both* directions. Although the ram at left is doing twice the work—both rams travel at equal speed for their entire strokes.



EQUAL RAM SPEED, REGARDLESS OF LOAD WITH THE BENDIX FLOW EQUALIZER

Now... you can equalize the speed of two unevenly loaded hydraulic rams, in both directions—raising or lowering—with the Bendix Flow Equalizer. All outside adjustments have been eliminated... the metering is automatic and foolproof.

The Bendix Hydraulic Flow Equalizer eliminates the necessity for mechanical interconnection or for two pumps. The installation is simple and inexpensive... merely replace the "T" in the pressure line from the control valve with the Equalizer to accomplish full synchronization of the hydraulic rams.

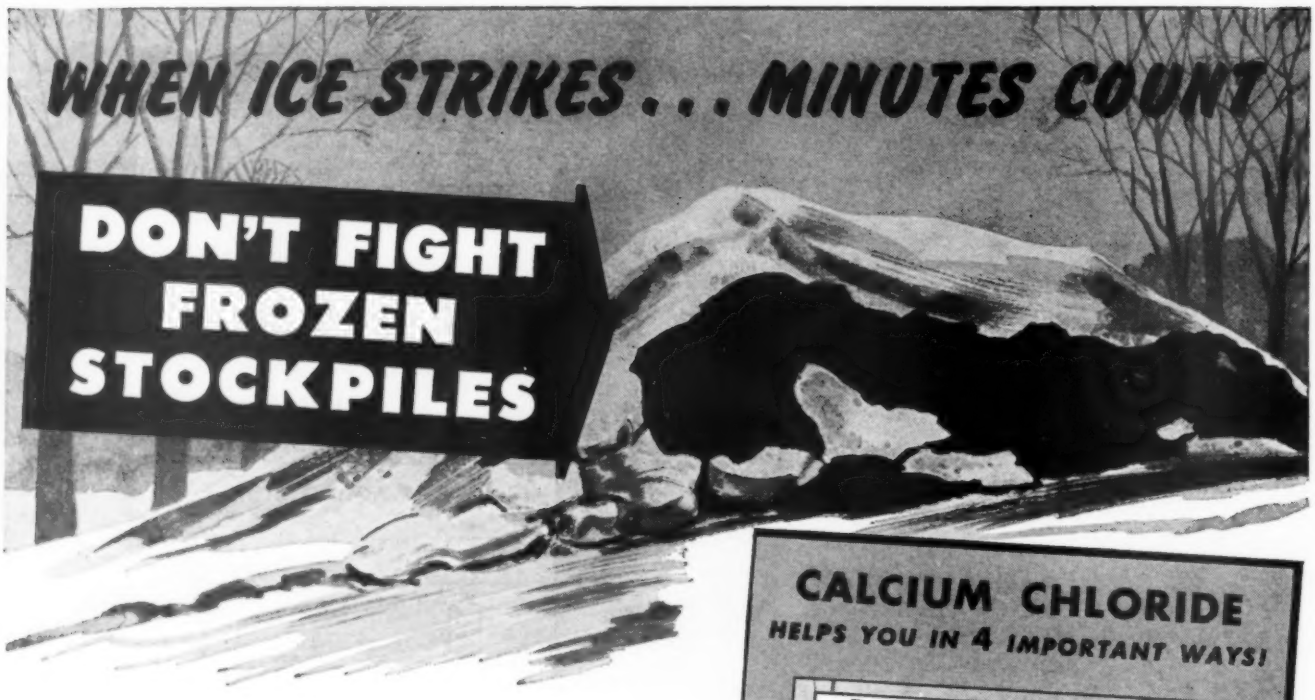
A special proportioner version of the unit is available which will split the flow into two lines with proportional flows greater in one line than the other. Operated in the reverse direction it will *combine* two such uneven flows, constantly maintaining the specified proportion between the two lines.

The Equalizer shown is the ½" P. T. size and will handle flows of from 2 GPM to 8 GPM. Wire or write for Bulletin BA-100 containing complete installation and performance data. Our engineering department is available to confidentially assist you on any hydraulic problem.

© 1945, Bendix Aviation Corp.

Pacific Division
Bendix Aviation Corporation
NORTH HOLLYWOOD 7, CALIF.

• MANUFACTURERS OF A COMPLETE LINE OF HYDRAULIC EQUIPMENT FOR INDUSTRY •



YOU can't fight a fire with a frozen bucket of water. Nor can you fight icy highways with a frozen stockpile of abrasives.

Extensive preparations for the winter season just ahead are effectively nullified unless the abrasives you stockpile now are protected *now* by freezeproof calcium chloride treatment.

The few dollars you invest for stockpile treatment will actually save hundreds when your ice control operations get underway. Less men and equipment will be needed for loading of trucks. Valuable time will be saved. And the treated grits will go farther, do a much more effective skidproofing job.

Calcium chloride treatment gives maximum protection under any conditions for, as the Committee on Safe Highways of the American Road Builders' Association has reported, "the value of the chemical treatment lies in the anti-freeze properties of its solutions. Calcium chloride may provide protection against freezing at any temperature down to minus 58 degrees F."

Write today for complete data on stockpile or storage bin preparation. Save money while doing a better ice control job this winter.

CALCIUM CHLORIDE ASSOCIATION
4145 Penobscot Bldg. Detroit 26, Mich.

CALCIUM CHLORIDE

FAST · POSITIVE · ECONOMICAL

Equipment Maintenance

More States Planning New Buildings

2½ Million Dollar Shops and Equipment Housing for N. Y. State

THE shop and housing facilities for the highway maintenance equipment operated by the New York State Department of Public Works should be classed as "breach rather than observance," reports V. L. Ostrander, superintendent of operation and maintenance, New York department of public works.

In the ten districts of the state but one shop is suitable, one or two more require considerable enlargement and refurbishing, while the rest call for virtual replacement. Under the supervision of the ten district engineers are the fifty-seven counties of the state lying outside of the city of New York. The state's housing and shop facilities in these counties are at a decidedly lower level of condition and suitability than the district shops.

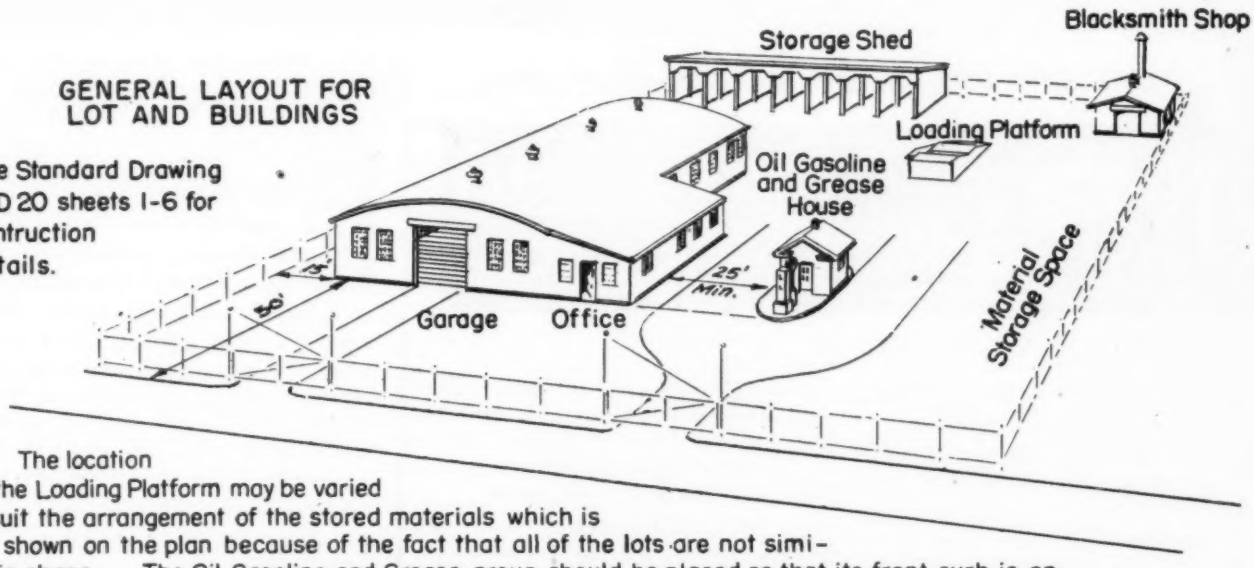
A program of acquisition of necessary additional land, reconstruction of shops where practicable, and building of new shops, housing and storage facilities to complete the highway maintenance plant to adequate levels for both districts and counties is now under way. It is a five-year program totaling upwards of five million dollars to be financed from the state's Postwar Reconstruction Fund, with an appropriation of $2,440,000 available for the current year's work, upon the following approximate allotment: District office buildings, $470,000; District shops, $1,430,000; County offices and shops, $540,000.

It is intended that these facilities shall be adequate for a reasonable future term. Details of the planning are well under way but actual construction will not be attempted until the labor and supply situation for construction work has become appropriate.

W. Va. Needs 25 New County Buildings

WEST VIRGINIA (where the state maintains nearly all roads) also has plans for modernizing and adding to repair shops and county and district headquarters facilities, according to E. L. Worthington, state maintenance engineer.

During WPA days, the state began a program of developing standard county headquarters for each of the 55 counties. There are still 25 counties in which it will be necessary to provide suitable facilities and these are planned in the postwar program. Ten district garages are also to be improved.


GENERAL LAYOUT FOR LOT AND BUILDINGS
See Standard Drawing 17 D 20 sheets 1-6 for contruction details.
Storage Shed
Blacksmith Shop
Loading Platform
Oil Gasoline and Grease House
25' Min.
Material Storage Space
Garage
Office
The location of the Loading Platform may be varied to suit the arrangement of the stored materials which is not shown on the plan because of the fact that all of the lots are not similar in shape. The Oil, Gasoline and Grease group should be placed so that its front curb is on a line flush with front of Garage Building, as shown Fence can be placed either at or near the Highway Right of Way line or on line with front of the building. These lots should contain approximately two acres of ground.

West Virginia road maintenance will be speeded by completion of this type of facilities in remaining 25 counties
Headquarters Garage in Jefferson City

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MAINTENANCE
TOOLS
for
FAST REPAIRS
on the Job or
in the Shop
The OTC PULLING SYSTEM makes quick work of removing and replacing gears, bearings, sleeves, wheels, pulleys, shafts and other close-fitting parts—without damage to machinery, without back-straining labor. Approved by Hyatt, M-R-C, New Departure, SKF and Timken for use on their bearings. Portable . . . as effective for field maintenance and repairs as for shop use.
To meet YOUR Needs—OTC GRIPOMATIC PULLERS, PUSH-PULLERS, Pulling Attachments and Adaptors. Heavy Duty BOX WRENCHES and Special Tools are made in a wide range of sizes and types.
OTC Maintenance Bulletin shows some of the many time-saving uses of OTC TOOLS. Write for a copy.
OWATONNA TOOL CO., 319 Cedar St., Owatonna, Minn.
PULLING ATTACHMENTS
GRIPOMATIC
PUSH-PULLERS
Heavy Duty BOX WRENCHES
SLEDGING WRENCHES, SPECIAL TOOLS

Minnesota: Outside Engineers Hired; Large Sites Planned

WRITES C. L. Motl, maintenance engineer, Minnesota state department of highways:

As to Minnesota's plans and program for enlarging its facilities, including repair shops, storage buildings and office space, I am glad to say that we are in the process of developing an extensive program which should just about double these facilities. We are planning on substantially increasing our district headquarters buildings, and also many substations throughout the state. Some outside engineering and architectural service has been contracted for to assist in taking care of the design and detailed preparation of plans.

A point of interest is the ground space believed desirable for each location. An extensive study of what was deemed necessary showed that for a district headquarters shop, a site comprising several acres was desirable; for sub-station points, at least one acre. These sites, in addition to providing space for the building and the parking of equipment that is not ordinarily placed in storage, are used for the storage of such materials as posts, culverts, stockpiles of gravel, stockpiles of pre-mixed bituminous materials, etc.

In selecting the sites we try to choose a location that will not be objectionable to those occupying the surrounding area. The sites are usually on the edge of town and adjacent to other areas used for commercial or semi-commercial purposes. Considerable attention is paid to proper maintenance of the sites, so they are usually attractive when compared to the surrounding area.

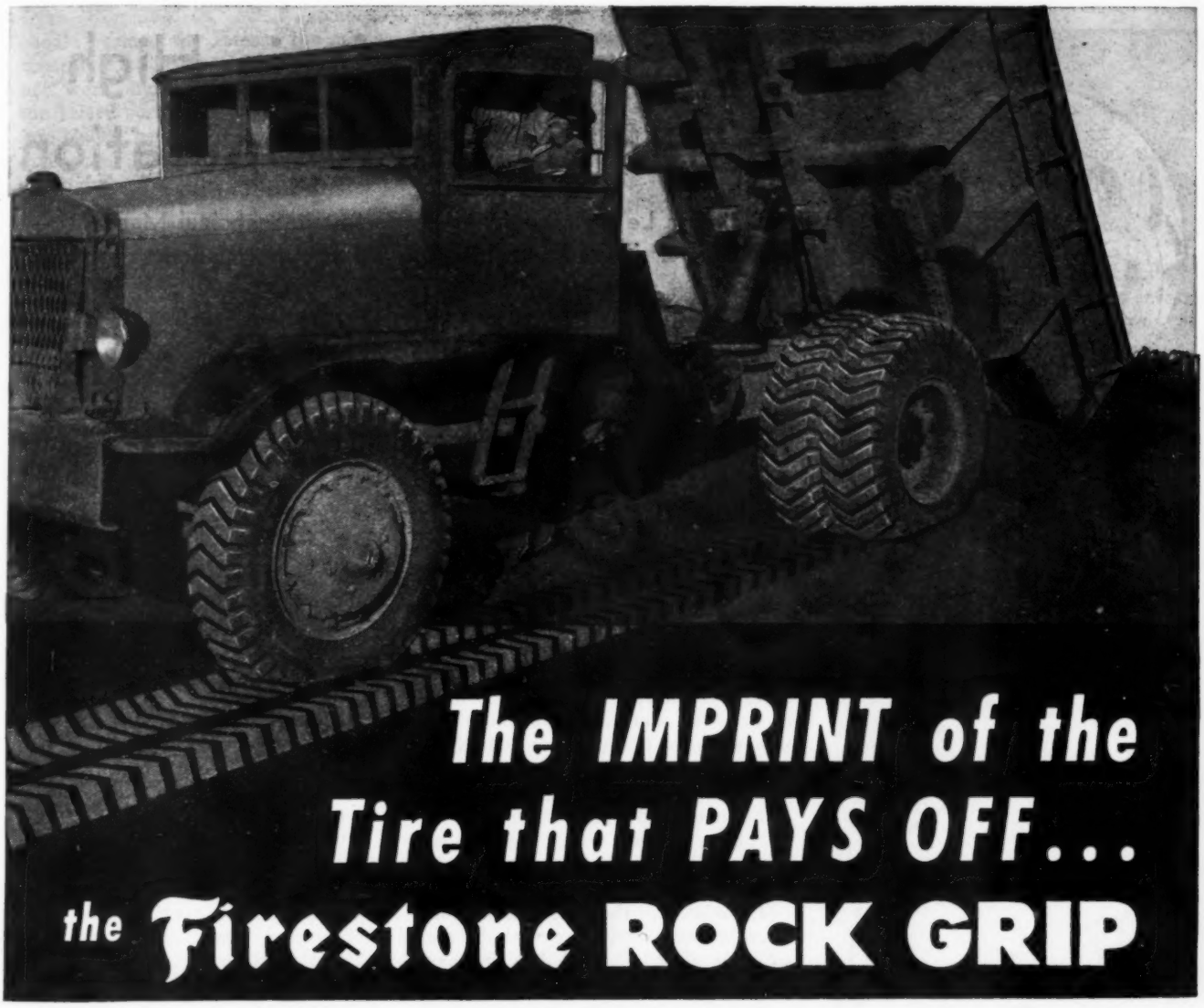
Oregon: Ready to Go on 12 Buildings

From E. A. Collier, Maintenance Engineer, Oregon State Highway Commission:

The Oregon highway commission has 4 main repair shops and warehouses and 130 section maintenance quarters at strategic points. Less than half of these locations are equipped with adequate buildings. Suitable buildings of efficient design and pleasing appearance are a great help to maintenance and encourage pride in the men who work out of them.

As soon as conditions will permit, it is planned to construct by contract a number of buildings for storing equipment and making minor equipment repairs. One or more rooms are also required for State Police offices at many of these section headquarters. Sites have been secured and plans are prepared for 12 buildings to be constructed in the first postwar period. These will be of lumber, averaging in size about 32 ft. by 90 ft., at a cost for buildings, fences, gas pumps, grading and surfacing of about $8,000 each. At some of the remote sites, houses for some of the crew are to be built. Eight more sites are being purchased and plans made. The first postwar period construction of this type will run $200,000 and will be followed by a second and third period during which similar construction will cost about $200,000.

In addition to these section headquarters, additional buildings are planned at the main Salem garage and warehouse. A complete plan with sufficient buildings for future expansion has been made and the various buildings will be put under construction as the necessity for them appears and as labor and materials become available.



The IMPRINT of the Tire that PAYS OFF... the Firestone ROCK GRIP

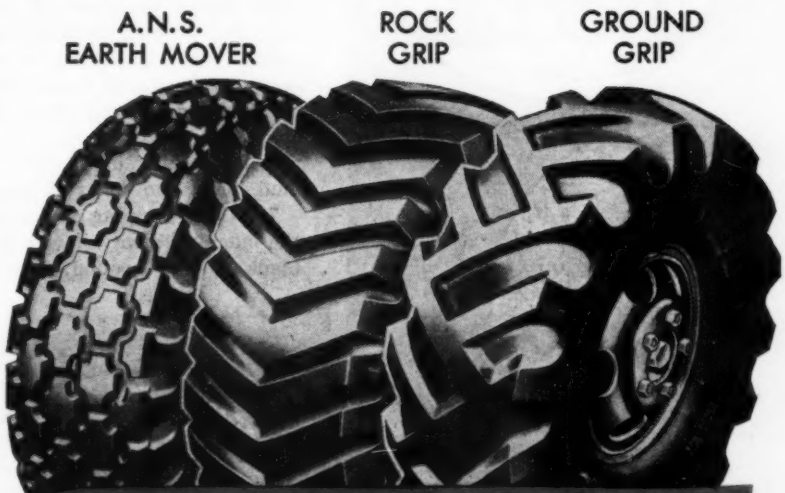
YES, there *is* a tire that pays off — it's the Firestone Rock Grip. It pays off because it reduces operating costs — puts more money on the profit side of the ledger.

Look at that Rock Grip tread. It takes hold and out-pulls any other off-the-highway tire made. Tough? It has plenty to spare for the toughest job. And like other Firestone Off-the-Highway tires, the Rock Grip body can be retreaded many times. That is the kind of a tire that saves you money.

The next time you buy Off-the-Highway tires, make them Firestone tires. Then let your records show you how your tire operating costs go down.

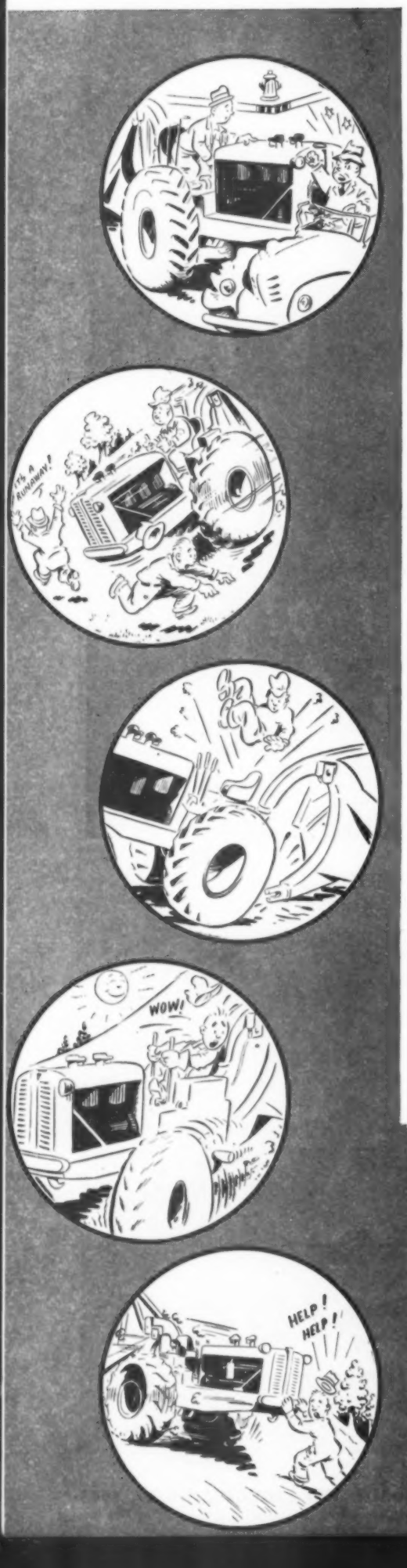
For the best in music, listen to the "Voice of Firestone" every Monday evening over NBC network.

Copyright, 1945, The Firestone Tire & Rubber Co.



Firestone

OFF-THE-HIGHWAY TIRES



Playing It Safe in High Speed Scraper Operation

From Le Tourneau War Department Technical Manual on Tournapulls, reprinted with permission

As with all heavy equipment, reasonable precautions must be taken when operating or servicing high-speed, self-powered scrapers. By observing the following precautions, difficulties similar to those illustrated by cartoon can be avoided.

1. Do not travel at reckless speeds, especially when in congested traffic. Keep the machine under control at all times.

2. Do not kick the machine out of gear when traveling downhill. When traveling downhill make sure that the machine is under control and steer carefully. On steep hills, be prepared to drop the blade to supplement the power of the brakes if needed. Keep the brakes in good working condition.

3. Have good lights when working at night. Travel slowly in extreme dusty conditions where vision is obstructed.

4. Make sure the safety cable connecting bottom of yoke with bottom of main case is installed when operating.

5. Make sure wheel bolts are kept tight. Raise the wheel off the ground and use a long extension on the wrench when installing to make sure they are drawn up tight. Check bolts regularly to prevent them from loosening.

6. Keep the deck-plate clean of mud, tools and other obstructions.

7. When stopping and crawling off the machine, always lower the scraper blade to the ground. This prevents the chances of anyone becoming injured in event the blade should be lowered by accident. It also prevents the scraper pull from rolling downhill if parked on an incline. Also pull out the engine shut-off control and turn it ¼ turn when leaving the machine to prevent it from being started by accident.

8. Stay out from in front or rear of the wheels, even when parked. Someone might start the machine, either by accident or by not knowing anyone is in the path of the wheels. Know the whereabouts of your fellow workers at all times when working on the machine.

9. Keep the hands free of cable and working parts when in operation. Also keep hands and clothing away from water pump belts and all moving parts of the engine.

10. Do not stand directly in front of a wheel when inflating the tire, because of the danger of the locking ring and sliding ring blowing off if not properly seated.

11. Do not use weak frayed cable. When handling frayed cable, always wear gloves.

12. Do not attempt to make adjustments on the engine while it is running. Shut off engine when making power control unit clutch or steering clutch adjustments. Keep hands free from the steering clutches when turning them over in making an adjustment.

13. When changing blades or working underneath the scraper, always block up under the bowl to prevent it

from dropping in event someone should accidentally release the power control unit hoist brake. Likewise, do not work under the apron when in the raised position without first placing blocks between the apron arms and scraper sides to prevent the apron from dropping.

14. Do not attempt dangerous operations or those requiring the assistance of others without presence of enough help and tools to handle the job.

15. Do not work behind the tailgate when it is pulled forward without first blocking it in the forward position.

16. When replacing springpipe cable or tailgate return springs, use care to avoid being injured in any manner by the springs, which have considerable pressure behind them.

17. When barring the engine over by hand, always be sure the compression release is open. Otherwise the fuel might be injected, causing the engine to fire.

18. Never attempt to run the engine while the priming valve is open. This would cause dangerously high speeds. The emergency shut-off control located on the dash panel can be used in an emergency to bring the engine speed under control.

19. Always be sure the engine is free before attempting to start it.

20. Keep the rocker housing covers on the engine.

▼

Care of Hydraulic Hose Used for Hydraulic Tractor Equipment

From material prepared by the Eastman Manufacturing Co., Manitowoc, Wis.

More hose is destroyed by improper handling than by use.

Heavy objects should not be dropped on the hose, nor should it be subjected to sharp blows, pinching, twisting, or chafing. A sharp impact may cause a permanent kink in the wire strands on which the strength of the hose is dependent. When this happens, recurring applications of hydraulic pressure subject the kinked wires to a bending and unbending action which eventually causes them to break. Once the wires are broken, the hose lacks sufficient strength to withstand the hydraulic pressure and leakage occurs.

Installing Hose

Hose has a synthetic lining impervious to oil, and breaking of this lining destroys the usefulness of the hose. When installing the hose lengths, care should be taken so that the hose is not twisted. They should be mounted in a way that will subject them to as little twisting action as possible. Elimination of torsional (twisting) strain adds to the working life of the hose.

Hose Couplings

Two wrenches should always be used on hose couplings. Couplings are made with a hexagonal section to allow for a wrench grip that will hold the hose stationary in the correct position while drawing up the union connection. Always use this extra wrench grip to prevent twisting.

When installing adapter unions, the cone-shaped fitting inside the adapter must be turned toward the hose to receive the cone of the hose coupling.

Spare hose should be stored in straight lengths and, when possible, kept in dark cool locations.

▼

Assembly of Hydraulic Pumps

The following instructions are given in a leading manufacturer's hydraulic bulldozers maintenance manual, in connection with the general preparations for any work on their hydraulic pumps. These same instructions are good advice for any operations on hydraulic pump units.

1. Be sure that all parts are cleaned thoroughly. Work on a clean bench, keep your hands and tools clean, use clean cloths for wiping and to lay parts on.

2. Do not re-use damaged oil-seals on rotating parts. Have a set of good seals for front and rear shaft openings on hand before starting assembly.

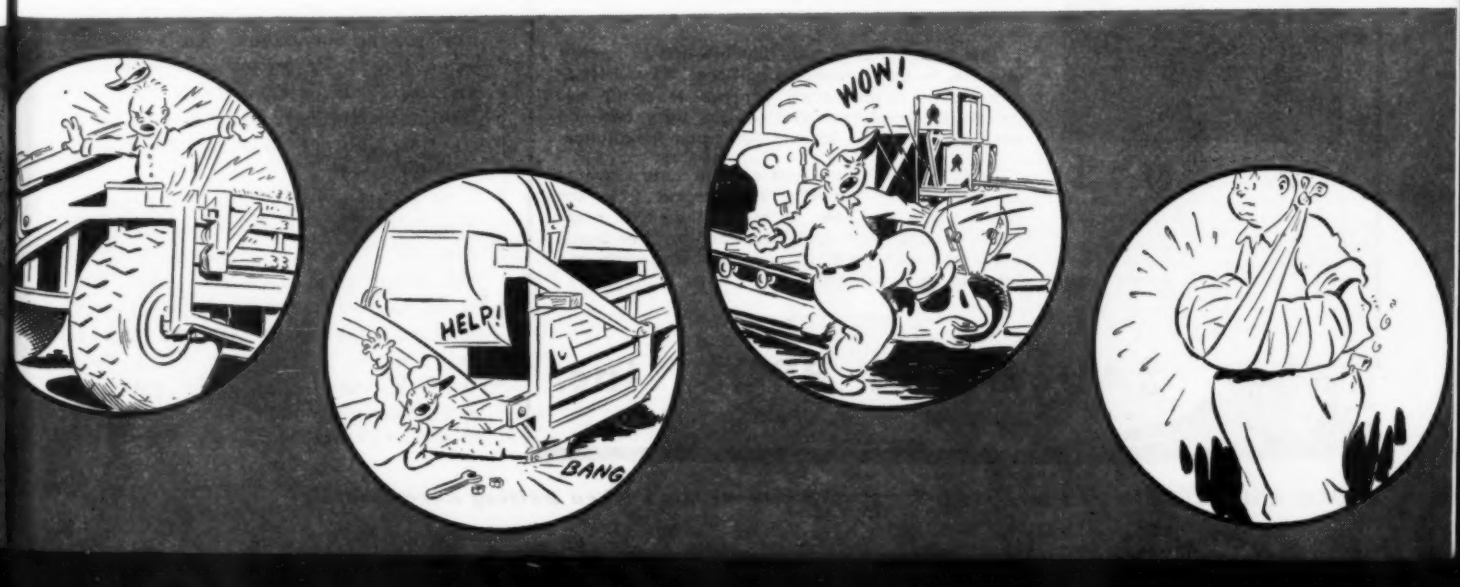
3. Inspect carefully the crank-slot in the front end of the drive-shaft for burrs, scratches or dirt and see that this is filed and dressed smooth so that it will not scratch or cut rubber seal ring when inserted.

4. Similarly inspect the splined end of the coupling shaft which slides through the rear seal. Remove any burrs and sharp corner or other obstructions that might damage the seal. Even very small and hardly visible cuts in these Neopreme rubber seal rings are likely to result in starting a leak which grows continuously with the flow of oil under pressure. Neopreme rubber is valuable material and special care should be taken to avoid wasting seals. Careful installation will insure a tight seal and long life.

Caution: In installing seals be sure that shaft is absolutely dry and free from dust, oil or grit. Do *not* use oil on shaft or ring. The Neopreme rubber ring must grip the shaft firmly in order to drive the seal assembly with the shaft. Keep polished surfaces of seal-seat and seal-cup clean and free from scratches. Handle all parts with care.

▼

Are *all* lubrication points on your tractor or road machine being checked systematically? While the average piece of equipment is designed to be lubricated at 8 to 10-hr. periods, many points need less frequent lubrication. But this doesn't mean those points shouldn't be checked. Keep checking them all the time.



STRAYER PORTABLE CONCRETE PLANTS

20 to 40 YARDS PER HR.

Make 20 to 40 yards of specification concrete per hour on the job. One-man operation and a helper to handle cement bags. One hour to set up. Move from job to job. Write for booklet today to 3510 Geist Rd.

ERIE STEEL CONSTRUCTION CO.
ERIE, PENNSYLVANIA
Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

SAUERMAN
Long Range Machines

Explanation of Picture. — The above picture of a small Sauerman Scraper digging gravel from pit and delivering to crushing plant shows the simple effectiveness of this method. This particular size of Sauerman machine consumes 4½ gals. of gasoline to move 45 cu. yd. of material per hour.

Dig, Haul and Dump for a few cents a yard

PROBLEMS of digging from pits, ponds or banks and many other material-handling jobs are simplified by using a Sauerman Power Scraper or Cableway.

This equipment is very flexible and is readily adapted to any ground conditions. First cost is reasonable, maintenance expense is small and the simplicity of operation permits easy one-man control of even the largest Sauerman installation.

There is a size and type of Sauerman machine to meet every capacity requirement from ten cubic yards an hour to many thousand cubic yards a day. And each machine, large or small, offers greatest possible economy of power and labor in its appointed task.

WRITE FOR CATALOG

SAUERMAN BROS., Inc.
588 S. CLINTON ST., CHICAGO 7, ILL.

Estimating Winter Severity and Salt Needs

Since snow and ice conditions vary throughout the snow-belt area, commissioners often experience difficulty in using standardized compilations of winter weather information either to forecast their winter needs or to keep informed of storms in progress. As a result, many of the road and highway departments have developed systems of their own to fit their individual local problems in gathering such data. The experience of some commissioners indicates that the total cost of obtaining detailed winter road reports during storms comes as high as $50 a day in some sections of the country, much more in others.

While this on-the-spot coverage is necessary, it doesn't help in planning *ahead* for the unusual and unexpected snow and ice emergencies that must be anticipated every year. To get around that difficulty, some commissioners use annual precipitation figures to forecast the overall severity of winter for their region. They take the annual precipitation figure for the area, subtract summer rainfall from it and put the remainder down as snow and freezing rains.

While this may not always be accurate to a fraction of an inch, since winter weather varies from year to year, commissioners using the method report that it is a fairly precise way of forecasting winter snow and ice possibilities. They find it useful in making a good guess about how much equipment, material and manpower they will need in the months ahead.

Using it, commissioners who rely heavily on tested short cuts and labor-savers like rock salt can plan ahead and lay in sufficient supplies of it early in the season against the time when the first snows begin. Applied immediately at the start of a storm, rock salt does about 75% of the snow and ice removal job. The salt crystals bore through ice and snow, break them up and prevent them from bonding to the pavement. As a result, when the plows go out, the salt has already done part of their job. In light falls, the rock salt alone is sufficient to melt the snow and the plows are not needed.

In addition to providing a dependable way of predicting the amount of materials he will need for the winter, the forecast method also aids the commissioner in planning his yearly budget. Using it, he can tell with a fair degree of accuracy just how much he must allocate for supplies, equipment and manpower during the months to come.

Spread Safety . . .
—TAME THE TWIN TERRORS ICE and SLEET

WITH A

Good Roads Champion

MODEL BK-44

TRUCK-MOUNTED SPREADER

Safe motor travel . . . safe plane landings . . . are absolute certainties when the big BK-44 tames the twin terrors . . . ice and sleet . . . with anti-skid materials.

The Good Roads Champion Model BK-44 spreads sand, gravel, cinders, calcium chloride or salt—wet or dry—thoroughly and evenly with blanket-like effect.

Spread width is easily adapted to an airport runway, a single traffic lane on a country highway or an urban street, curb to curb . . . each receives an accurately controlled, evenly distributed layer of abrasives or chemicals.

The width of the spread is unaffected by the truck speed for it is controlled entirely by the independent power plant to meet and master any hazardous condition encountered.

For complete details write for folder No. 120

Good Roads MACHINERY ESTABLISHED 1878

GOOD ROADS MACHINERY CORP.

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GOOD ROADS BUILDS CHAMPIONS

Right at Home

DIGGING ROCK AND STONE

YOU COULDN'T put this bucket on a tougher job. For years it has been helping deepen a ship channel,—digging in hard ffint bottoms one day, handling rocks and stones on other days. Yet, because its lips and teeth are protected against rapid wear with Coast Metals Hard-Facing, it has been rendering outstanding performance.

Your bucket teeth, lips, runners and other parts also can be given a new lease on life by Coast Metals Hard-Facing! Or, better yet, hard-face your NEW bucket parts and they will serve ever so much better. Then, after slight wear, they can be rebuilt repeatedly and the cost and delay of getting replacement parts eliminated.

Write for "How To Make Construction Equipment Last Longer"

COAST METALS, INC.
Plant and General Offices:
1232 Camden Ave., S.W. Canton 6, Ohio
Executive Offices:
2 West 45th Street, New York 19, N. Y.

COAST METALS
hard-facing weld rods
MAKE YOUR EQUIPMENT LAST LONGER

Hand Tool Hazards

From "The Maintenance Engineer," published by the Corps of Engineers, for personnel engaged in upkeep of army engineering equipment, comes the following homely advice about a couple of every-day sources of bruises and cuts.

The Hammer

Don't be a Hammering Hank when using a simple gadget like a hammer. Most hammer accidents are caused by loose hammer heads and the guy using the hammer. Make sure the head is wedged securely on the handle and that the head and handle are not chipped or cracked. Strike the object with the full face of the hammer; nails, especially, fly like bullets and can cause painful injuries when they're not smacked squarely. An oily or greasy handle, or sweaty palm, will cause the handle to slip out of your hand. Keep your hammer clean and your hands dry.

Wrenches

There are many types of wrenches, but some general principles apply to the use of any kind. A misused wrench can easily mean a busted knuckle, or wrenched back, or strained muscle. Often, men try to use a wrench that doesn't exactly fit the nut they are tightening or loosening; when the wrench slips—and it usually does—somebody gets it. Whenever possible, pull on the handle—don't push. If you must push, keep your knuckles in the clear.

Avoid falls by seeing that your footing is good before you pull. Screw the movable jaw of an adjustable wrench tightly against the nut or the bolt you want to turn. Be sure the wrench opening faces in the direction that you're going to move the wrench handle. This will prevent the wrench from slipping off the nut and will prevent you from flying off the handle—in more ways than one.

Files

The sharp tine of an unprotected file can make a painful and disabling wound. See that there is a securely-fitted handle on each file you use. It is hazardous to carry a file in your pocket without a handle over the tine. If you fall, the tine might be driven into your body.

Shunk *Snow Plow and Ice Removal* **BLADES**

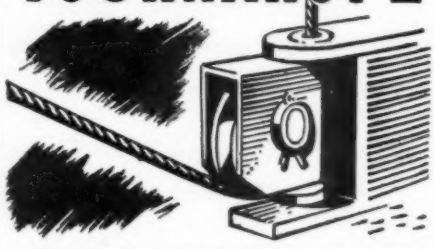
Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

FOR ALL TYPES AND MODELS OF SNOW PLOWS
Various widths, lengths, thicknesses--flat or curved--standard or special--punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE
Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

Shunk
MANUFACTURING COMPANY
ESTABLISHED 1854
BUCYRUS, OHIO.

For Your Tractor Equipment USE
TOURNAROPE



Specially built for LeTourneau Tournapull and tractor-drawn equipment . . . proved in service on thoutands of units. Steel, stranding, preforming, and lubrication are tailored to dirtmoving service. Flexes easily over equipment sheaves.

Try Tournarope on your tractor equipment of any make . . . you'll find its long time service saves you time and money.

SIX SIZES—3/8", 1/2", 9/16", 5/8", 3/4" and 7/8".

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LeTourneau Distributor
R. G. LeTOURNEAU, INC.
PEORIA, ILL., STOCKTON, CALIF.
TR2

AED Executive Committee Meets in Chicago

The Executive Committee of Associated Equipment Distributors met Sept. 28, 29 and 30 at Chicago at the Edgewater to consider problems in connection with disposal of Government-owned construction and road-building machinery, and plans for A.E.D.'s Annual Membership Meeting in January, 1946.

Attending the meeting here were:

H. O. Penn (Pres.), H. O. Penn Machinery Co., Inc., New York.

F. B. McBath (Exec. V. P.), Columbia Equip. Co., Portland, Ore.

H. M. Davis (P. P.), R. B. Everett & Co., Houston.

W. W. Bucher (Treas.), R. E. Brooks Company, New York.

C. G. Borchert, Borchert-Ingersoll, Inc., St. Paul, Minn.

M. R. Hunter, Hunter Tractor & Machinery Company, Milwaukee.

G. F. Lowe, Lowe Machinery Company, Chicago.

G. W. Van Keppel, G. W. Van Keppel Company, Kansas City, Mo.

W. A. Danner, Parker, Danner, Inc., Hyde Park, Mass.

G. E. Hillsman, Hillsman Equipment Company, Chicago.

C. L. Woolley, Tractors, Incorporated, Providence, R. I.

A. F. Sersanous, Loggers & Contractors Machinery Co., Portland, Ore.

T. F. Just, Just Equipment & Supply Co., Montreal, Quebec, Canada.

Following the Executive Committee meeting, Executive Vice President McBath and Executive Secretary Carol F. Winchester departed for the West Coast to attend local association meetings in Montana, Idaho, Washington, Oregon, California, Utah and Colorado, which tie-in with regional conferences during October and November by directors of A.E.D.'s 15 geographical regions throughout the United States and Canada aimed at implementing the organization's program on behalf of the industry in connection with post-war industries and problems.

▼

ARBA Official Nominations 1946 Officers and Directors

As submitted by Nominating Committee and subject to confirmation at the Association's annual meeting next January, in Chicago.

President: James J. Skelly, Pres., James J. Skelly Co., Media, Pa.

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Bernard Gray, General Manager, The Asphalt Institute, New York, N. Y.; W. W. Polk, Chief Highway Engineer, Dept. of Public Works and Buildings, Springfield, Ill.; A. R. Taylor, Consulting Engineer, Tarmac Dept., Tar and Chemical Division, Koppers Co., Pittsburgh, Pa.; Nello L. Teer, Jr., Pres., Mecklenburg Construction Co., Durham, N. C.

▼

A fifteen-million dollar start on the Congress street superhighway is the biggest project in Chicago's "go-ahead" program. Two bridges over the Chicago River will cost $2,600,000 and 22 street widening and rebuilding parcels will take $4,300,000, including lighting and signals.

GRUENDLER CRAFTSMANSHIP SERVING INDUSTRY 60 YEARS
With a remarkable record of accomplishments

for Greater Capacity...

Here is a JAW CRUSHER
built to do a better job on the toughest rock

Operators of Crushing Plants on location of harder rock deposits, asked the Gruendler Engineers for a sturdier Jaw Crusher better able to withstand the terrific strain on the toughest jobs, and still increase their ton per hour output.

This problem answered by our Engineers who with their long experience together with advanced designing and application of improved and tougher steel alloys—now offer a BETTER CRUSHER to do a BETTER JOB.

WRITE for ILLUSTRATED DATA and BLUEPRINTS

Manufacturers of PRIMARY AND SECONDARY HAMMERMILLS FOR LIMESTONE DISTRICTS

GRUENDLER
CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI

The LEADER must LEAD

Raybestos Leads in the Development of Industrial Friction Materials

Full Metallic Clutch Plates for Caterpillar D-7 and D-8 Steering Clutches.

Raybestos leads with new products, new processes, and a new plant for the manufacture of full-metallic industrial friction materials.

THE RAYBESTOS DIVISION of Raybestos-Manhattan, Inc., BRIDGEPORT, CONN.

Raybestos

INDUSTRIAL FRICTION MATERIALS

BUY *ANOTHER* BOND

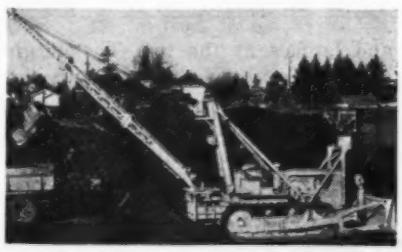
MANUFACTURER of FULL METALLIC, SEMI-METALLIC, WOVEN and MOLDED FRICTION MATERIALS.

(*Continued from page* 100)
removal which is to provide for the wages of operators and supplies, erecting snow fence and many miscellaneous matters. When reporting as to the cost of snow removal, the expenditure from the Miscellaneous Fund is generally given. The use of the equipment which may be very costly is generally forgotten as if it were simply something which the town had on hand.

New Equipment and Materials

New Combination Dragline, Clamshell and Crane Unit

A combination dragline, clamshell and crane unit for tractor mounting has been announced by the Hyster Co., Portland, Ore., and Peoria, Ill. The new unit, the Hystaway, permits a working of bulldozer, dragline, clamshell and crane. High partial use of the bulldozer can be made without removing the Hystaway unit from the rear of the tractor and when full bulldozer production is desired or



The Hystaway

other conventional uses of the tractor are needed the unit can be removed in less than one hour. The Hystaway can be installed in two hours. Full tractor mobility is retained as crawler track oscillation is not impeded by the unit; tractor rigidity when desired can be accomplished by a crank control at the mast head. The unit is easily transported by dump trucks or flat-bed trucks from one job to another for tractor installation.

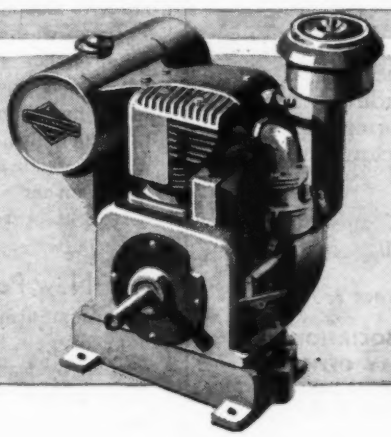
Short Length Belt Conveyors

A small powered belt conveyor unit, in 10 ft., 5 ft. and 3 ft. lengths has been placed on the market by the Island Equipment Corp., New York. These units can be coupled together to make as long a conveyor system as may be wanted. They can, due to

BRIGGS & STRATTON

ENGINES NOW ON THEIR

WAY BACK TO YOU!



BACKED by an outstanding record of valiant service in scores of standard and special wartime applications, Briggs & Stratton 4-cycle gasoline engines have returned to peacetime activities. With greatly expanded facilities for precision manufacture, we are now producing more and more quick-starting, dependable, trouble-free, Briggs & Stratton gasoline engines in a full range of sizes and models — recognized the world over as the preferred "air-cooled power".

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wis., U. S. A.

Air-Cooled Power

4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES

Standard Specifications for Highway Bridges

The 1944 edition of this book is a complete presentation of the specifications adopted by the Association. In four main Divisions, with 72 subordinate Sections, are covered all details of General Provisions, Construction, Design and Materials. Four Appendices carry tables of moments and shears, steel column formulas and graphs, a chart of truck, train and equivalent loadings and a diagram of permissible unit stresses for rectangular concrete columns.

262 pages, 6" x 9", cloth bound, **$2.00** postpaid.

Order direct from

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS
1218 National Press Building
Washington 4, D. C.

their short lengths, be twisted around to form any shape, will convey on the level, up or down grade. Two sections will make a 30° turn, three sections 60°, and four sections 90°. The entire assembly or system (from one end to the other) can be instantaneously controlled from the unloading end, by positive push button control. The belts of these units come in three different widths, 12 in., 16 in. and 20 in.

▼

New Electrode for Welding Cast Iron

An all-position mild steel electrode for welding and repairing cast iron is the latest development of Harnischfeger Corporation, Milwaukee, Wis. It fuses well with either mild or medium carbon steel. With a yield point of 50,000 lbs. p.s.i., the deposited metal has an ultimate tensile strength of 60,000 lbs., roughly double that of a good grade of cast iron. It is usable with either AC or DC machines (straight or reverse polarity on DC).

▼

New Post Hole Digger

A new automatic power driven post hole digger has been placed on the market by Equipment Sales Co., Madison, Wis. It can be mounted on any make of tractor having rear end power take off. The operations are fully automatic. The depth gauge is set anywhere from 20 to 44 ins., depending on the hole to be dug. The operator merely trips the auger and when the predetermined depth has been reached, it automatically raises and latches at the top. The digging and raising operations are all done with tractor power. Standard auger is 9 in. in diameter, but 12 in. and 14 in. sizes are available.

RAPID!

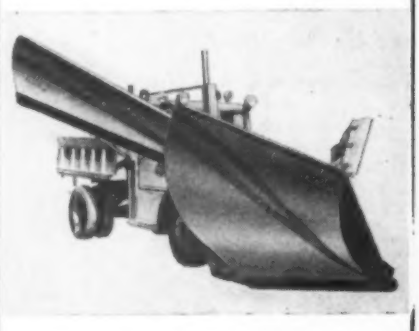
Cuts concrete and cuts labor costs to 2½c per square yard. Applicable to floor work and different types of inside horizontal work.

Very efficient in maintenance work of highways.

Boom folds down and readily trailed by any light truck. Make your compressor treble its output by hooking it to this machine.

Rapid Pavement Breaker Co.
1517 Santa Fe Ave.
Los Angeles 21, Calif.

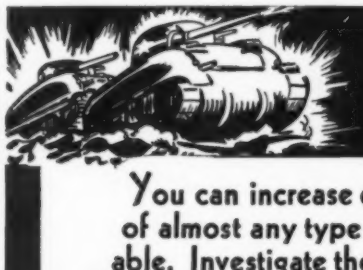
ROSS SNOW PLOWS



Ross Snow Plows are your insurance against snow blocked roads. Are your insurance that school buses, mail and other traffic vital to a community will get through. "Ross plows come in from a job well done, ready to go out on another."

Manufactured by

THE BURCH CORPORATION
Crestline, Ohio
Equipment Since 1875



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You can increase efficiency and simplify operations of almost any type of equipment by making it portable. Investigate the uses of EWC Wheels, Axles, Springs, Tongues, etc., to give your equipment added value. Write today for illustrated Bulletins, and for sound engineering help based on more than half a century of experience.

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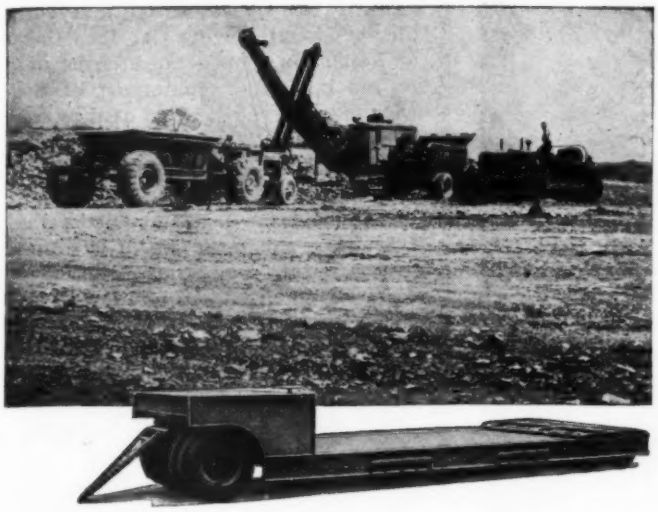
HANSON



Heavy Duty

Goose Neck... Low Platform

MACHINERY TRAILERS

CAPACITY: 10 TO 40 TONS... SEMI OR FULL

● Every successful engineer and contractor knows that his jobs depend on the 4 "G's" —

Get there.. Get going.. Get done.. Get on!

In two out of these four operations Hanson Trailers are big assets. They enable you to get there fast and to get on fast, with top loads and minimum haulage costs.

For your own haulage needs, check these important Hanson features — Heavy duty, goose-neck construction; Semi and Full types; 10 to 40 ton capacity; Oscillating rear axles; Pneumatic tires; Brakes of internal expanding, air or vacuum type; Timken bearings throughout.

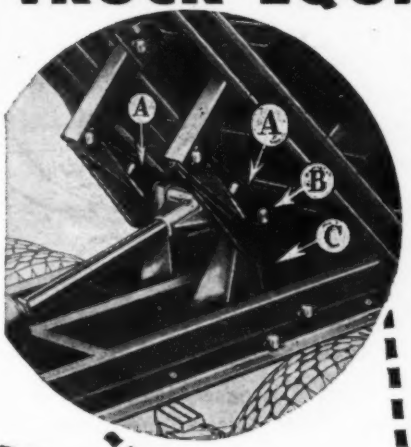
Send for folder 745 covering specifications and capacities stating size of Trailer you require.

THE HANSON CLUTCH & MACHINERY CO.
TIFFIN, OHIO

Why ANTHONY HYDRAULIC

REG. U.S. PAT. OFF.

TRUCK EQUIPMENT



Anthony Features of design and construction are the result of firsthand knowledge of job needs and customer requirements.

For example: This X-ray illustration shows the DOUBLE ARM "POWER SPEED" LIFT of the SUPER Hoist. Proved in the field through years of service. The steady, constant change in movement of piston and lift leverage compounds the power to give Anthony hoists a tremendous lift advantage at the beginning of the lift, when LOAD IS HEAVIEST, and increasingly faster action as body goes up and load lightens — notice too, the "RUBBER RESTRAINING BLOCKS" inside of links. These prevent "over-run and kick-back", and greatly simplify controlling the load when dumping or spreading materials.

HOISTS and BODIES for ALL
Motor Trucks • 6 Wheelers • Semi-Trailers

Dept. 13-E

ANTHONY LIFT GATE HYDRAULIC

SOLVES A MANPOWER PROBLEM

ANTHONY COMPANY
STREATOR ARMY E NAVY **ILLINOIS**

NOW — to build that better

World War II was fought and won to "build a better world!"

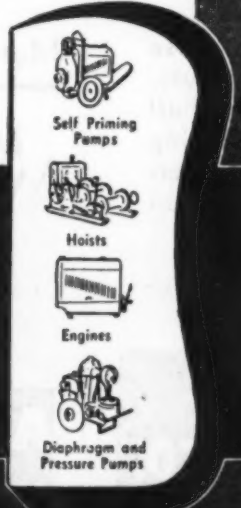
The fighting is done—the victory is won! We are proud that Novo Construction Equipment shared in the fighting, helped in the victory!

Now is the time for building that better world! The same Novo Engines, Pumps, Hoists and Generator Sets that served in the war, are ready to take part in the peace program! A better world means more of the better things for more of mankind. To get it, efficient and economical production methods must be used!

To build that better world, use that better built CONSTRUCTION EQUIPMENT—NOVO!

A few choice territories are still open. For full details about a Novo Distributorship, write or wire to the Sales Department, Novo Engine Company.

Allied Member of A.E.D.



NOVO ENGINE CO.

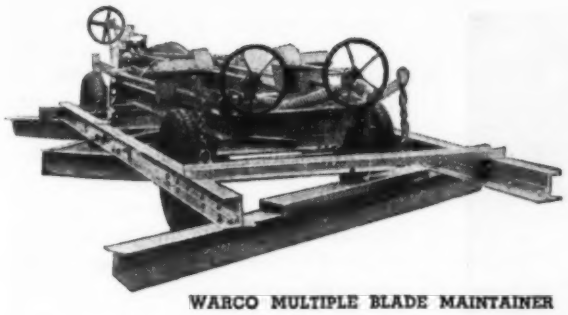
New 2-Yd. Scraper

A 2-yd. front dump scraper, Model CW-2, is one of the first post-war units to be released by LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Ia. This scraper is the improved industrial counterpart of the wartime airborne scraper, used by the Airborne Engineers. It is a sturdy yet light little scraper weighing only 2,550 lbs. The two rear wheels can be located either inside or outside the cut and it can make a full 90° turn or less within a circle diameter of 20 feet. The hitch is designed for operation behind high speed rubber-tired industrial tractors. When fully loaded, weight is lifted from the tractor's front wheels and much of the weight of the load is centered on the tractor's driving wheels for maximum traction. Bowl and apron are operated hydraulically by LaPlant-Choate's airborne pump. A three position valve enables the cutting edge to be held in position and exert effective down pressure. Other operating features include the ability to make cuts up to 11½ ins. and to produce smooth finished work.

Model CW-2 scraper

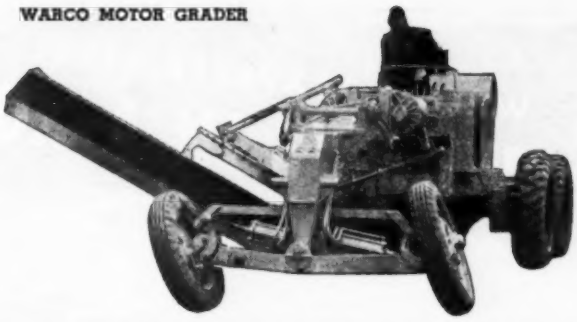
New Thinweld Attachment for Welding

A new 3-step Thinweld attachment that is stated to give wider range to standard arc welding machines and make it possible to weld from 10 amperes up through the maximum rating of the welding machine without any dead spots in the complete welding range has been announced by The Hobart Brothers Co., Troy, O. The No. 413 Thinweld attachment is furnished with a 3-ft. cable which is connected to the ground terminal of the welding machine and the ground lead is connected in turn to the wing nut on the Thinweld. By plugging the jack into the three alternative positions of the Thinweld (low, medium, high) it is possible to get three additional ranges of amperage. Intermediate points between low, medium and high can be obtained by use of the field rheostat. The current values



WARCO MULTIPLE BLADE MAINTAINER

WARCO MOTOR GRADER



WATCH THE SCOREBOARD

WARCO DUPLEX SCOOP

Out on that construction job – or where they're working like beavers on road making and maintaining it's results that count! Watch the Warco team* chalk up an impressive score in terms of earth moved at minimum cost. It's a team you can bank on – one that will bank money for you!

Around the Earth – Warco is Best!

*The team – Grader, Maintainer, Scoop, Terracer.

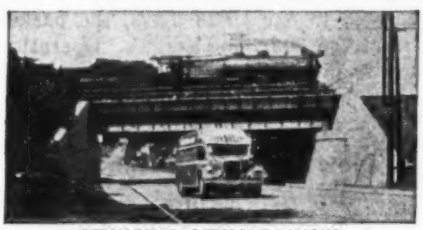
WARCO BUCYRUS OHIO

WARCO

W. A. RIDDELL CORP. • BUCYRUS, OHIO

Servicised Asphalt PLANK

"Easy to Lay" for WATERPROOF-PROTECTION-COURSE



SERVICISED ASPHALT PLANK

The use of Servicised Asphalt Plank Protection Course over membrane waterproofing on railroad underpasses, tunnels, and other structures has become standard engineering practice. The membrane must be protected from the wear which it will receive from roadbed ballast in the case of underpasses and tunnels, and from foot traffic in the case of roof slabs.

SERVICISED ASPHALT PLANK HAS BEEN the ANSWER for YEARS

Servicised Asphalt Plank solves the problem because it bears without distortion such unusual loads as railroad ballast, tracking, trains, etc.

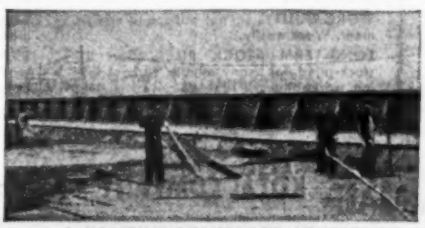
A POSITIVE LEAKPROOF COURSE

Being leakproof Servicised Asphalt Plank is non-absorbing, non-decaying therefore unaffected by ice or water and will not crack, split or puncture.

LASTS LONGER! LESS EXPENSIVE

Not only does it cost less to install than mastic protection or similar materials but it assures much greater efficiency and length of service. It provides a tough resilient covering which always adheres to and expands and contracts with the structure of which it is a part.

SPECIFICATIONS—for the use of asphalt plank as a waterproofing protection on railroad structures have been adopted by the American Railway Engineers and published in its manual.



A POSITIVE LEAKPROOF COURSE

SERVICISED QUALITY PRODUCTS

SERVICISED PRODUCTS CORP.

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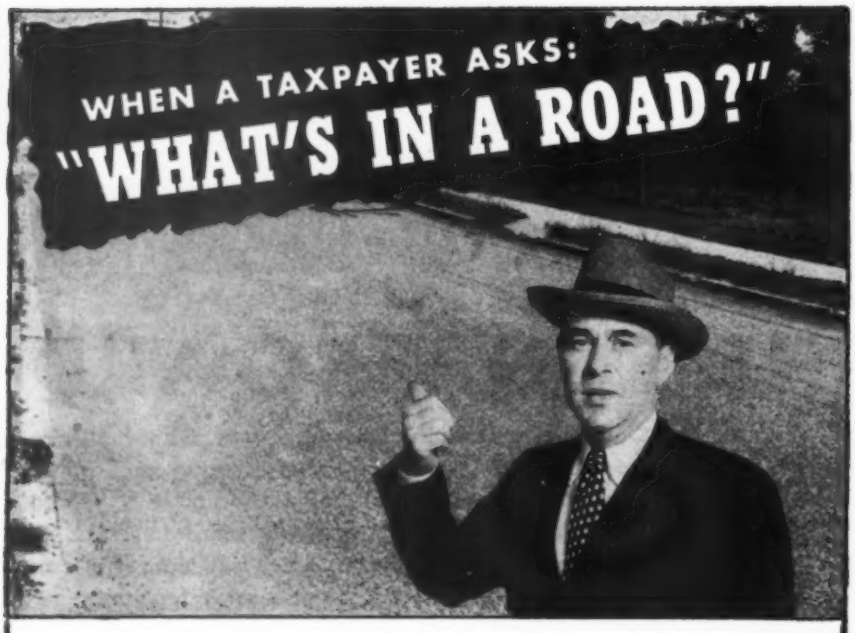


Today's taxpayer is taking a keen interest in roads and road-making. He is asking for better roads, smoother riding for his not-too-young automobile. And, as always, he is vitally concerned with lowered costs and economy.

KOTAL Master Mixes have proved a revolutionary development in attaining better roads at lower costs.

The Performance Record

of KOTAL Master Mixes has been demonstrated in five years' usage on the nation's roads . . . aiding the engineer with an all-weather, easy-to-use mixing material that helps to achieve tough, long-wearing roads.

The Cost Records

of KOTAL Master Mixes reveal that time and labor are saved, many new economies are being realized.

You will find unusually interesting the booklet which presents the detailed "inside story" of KOTAL Master Mixes. Write for your copy. The name of your nearest supplier will also be sent.

EASY TO USE. Quickly mixed, ready to lay. No preheating or drying.

STABILITY. Cure quickly and permanently. Do not shift, ravel or pick up. Open sooner to traffic.

WORKABILITY. Do not adhere to equipment. Work easily.

LONG-TERM STOCK PILES. Can be stock-piled for many months without losing workability.

SAVE TIME. Quickly made stock piles ready for immediate use without frequent fresh mixes.

SAVE LABOR. Actual road records prove fewer labor hours required.

SAVE MONEY. Savings in time and labor mean economies in road costs.

EXTEND PAVING SEASON. All-weather workability permits more months of operation.

MASTER MIXES KOTAL **KOTAL COMPANY ★ 52 Vanderbilt Ave. ★ New York 17**

KOTAL *Master Mixes*

The Advanced All-Weather Aid in Building Better Roads

obtainable in each of these sub-ranges are: Low, 10-20 amperes; medium, 15-30 amperes; high, 25—up to the minimum capacity of standard welding machines. When installed on Hobart arc welders at the factory, the No. 412 Thinweld installation is attached permanently on the back of the welding machine and is connected to the first and second range of the ten range switch.

▼

New Garbage Collection Body

An improved design in garbage collection bodies has been announced by W. E. Grace Manufacturing Co., Dallas, Tex. The body is made in two sizes—12 and 15 yd., to fit on 158-in. or 190-in. wheelbase trucks. It is of the packer type, being loaded at the front, with the material compressed toward the rear of the body. The packer, which can provide up to 5 tons pressure against the material to be compacted, is driven by 3 large screws, running the length of the

body. Complete unloading is accomplished without tilting the body, by opening the rear door and running the packer to the rear position. Features are: Rolling steel doors, 4½-ft. loading height, water-tight bottom and door, and overload release clutch to prevent excessive packing pressures. There is no hydraulic equipment required and the moving parts are reduced to one chain drive, the packer and the 3 driving screws. Operation is from standard truck power takeoff.

▼

New Tool for Opening Steel Drums

A drum opening tool that operates on somewhat the same basic principle as the can opener, has been placed on the market by Merrill Brothers, Maspeth, New York City. The tool cuts a smooth even hole and folds the edges back to the drum edge. It is stated to not only save long, tedious cutting with chisels or hatchets, but also to eliminate damage and mishaps encountered in the opening and handling of medium weight and light drums. The tool is made of a steel drop forging 23½ in. long, weighing 5½ lbs.

The Finest Performing Pumps Available

THE Army and the Navy have literally "poured it on" Barnes Pumps all through the war. Day in and day out, Barnes Pumps have stayed in there pumping and working without a "break"—asking only for more water. And if given the job, these pumps will do the same for you.

No wonder construction men who know pumps claim that Barnes gives them more gallons of water for their pumping dollar. These pumps are fast, sure, and steady.

Whether you want a "trickle or a torrent," there's a Barnes Automatic Centrifugal Pump to fit your job without waste of capacity or operating dollars. Made in sizes to deliver from 3,000 to 90,000 gallons per hour.

ATTENTION DISTRIBUTORS! A number of territories are still available. Write, wire or phone!

BARNES MANUFACTURING CO.

Quality Pump Manufacturers for 50 Years — MANSFIELD, OHIO

Outstanding for SERVICEABILITY *from* OPERATING CONTROL *to* TAILGATE

Write for the names of nearest PERFECTION distributors.

Every part of a Perfection Steel Dump Body and Hydraulic Hoist is designed and built to stand the gaff of constant service and rough and tough assignments.

Oversize and extra heavy parts where needed . . . modern construction methods and design of proved superiority . . . careful workmanship —all are reflected in PERFECTION's top performance and trouble-free service.

ARMY E NAVY 5TH CITATION FOR WAR PRODUCTION

THE PERFECTION STEEL BODY CO. GALION, OHIO

PERFECTION

TRUCK BODIES AND HOISTS

JACKSON VIBRATORY PAVING TUBES

Will help YOU Knock off those BIG JOBS and NET MAXIMUM Profits!

Upper photo shows dual vibrating tubes submerged. Inset—tubes raised.

Here's the machine that will enable you to meet and beat competition — to handle more of those highway and airport paving jobs and to realize the largest possible profit margin. It's keyed perfectly to the big post-war paving program. Added to the features which have long made it the most advantageous equipment of its type are many refinements coming out of its wide application to wartime paving of airports.

HERE ARE, SPECIFICALLY, SOME OF THE THINGS THE JACKSON VIBRATORY PAVING TUBE WILL DO FOR YOU:

- ✔ 1 Gives you perfect compaction and placement of even the harsh, otherwise unworkable mixes, and thus
- ✔ 2 Enables you to take full advantage of the dryer, more economical mixes.
- ✔ 3 Provides faster finisher progress.
- ✔ 4 Perfect puddling of concrete at the joints and side forms.
- ✔ 5 Through internal vibration of thick slabs up to 25 feet in width.
- ✔ 6 Ample reserve power to offset fast drying and setting conditions.
- ✔ 7 Ample Power Plant reserve to run extra vibrators, tools and lights.

To capitalize to the hilt on the unprecedented paving program ahead, by all means get the complete details on JACKSON Vibratory Paving Tubes. Write today.

Manufactured for
JACKSON VIBRATORS, Inc.
by ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICH.

With the Manufacturers and Distributors

New District Representative for Pioneer

Wm. Schannep

Wm. (Bill) Schannep has been appointed the new District Representative in the Pacific Northwest for Pioneer Engineering Works, Minneapolis, Minn. His territory includes Washington, Oregon, Idaho, Western Montana, Alberta and British Columbia. His headquarters will be at Seattle, Wash. For the past ten years Mr. Schannep has been employed by the Feenaughty Machinery Co., working out of their main office at Portland, Ore. He has just finished six months of factory training at Minneapolis.

WHO VISIT *Baltimore*

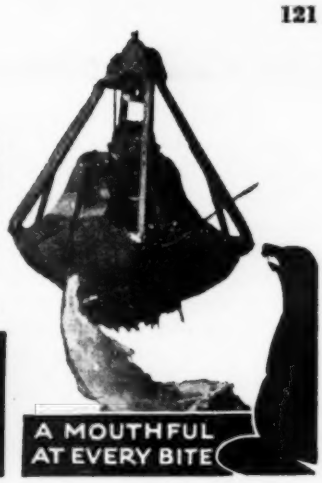
Strategically located right in the heart of the city's business, shopping and entertainment district. 700 rooms, each with radio, bath or shower. Service and food as faultless as wartime conditions will permit. Reservations well in advance will enable us to prepare for you—consequently, to serve you better.

Lord Baltimore Hotel
BALTIMORE 3, MARYLAND

Up from the Sea

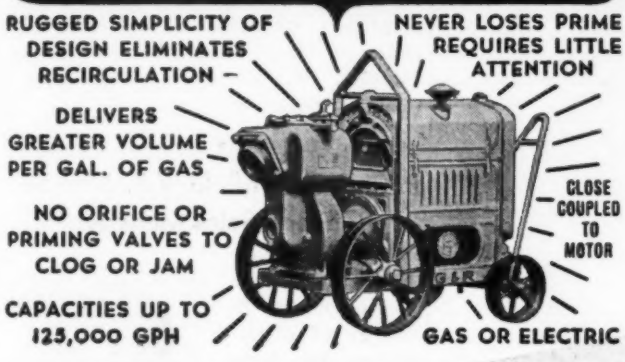
Owen dredging buckets are designed to come "up from the sea" with "a mouthful at every bite" and protected against the destructive action of water, mud and grit.

The OWEN BUCKET Co.
6070 Breakwater Avenue, Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.



OWEN BUCKETS

Streamlined Inside for Higher Efficiency and Lower Operating Costs


RUGGED SIMPLICITY OF DESIGN ELIMINATES RECIRCULATION
NEVER LOSES PRIME REQUIRES LITTLE ATTENTION
DELIVERS GREATER VOLUME PER GAL. OF GAS
CLOSE COUPLED TO MOTOR
NO ORIFICE OR PRIMING VALVES TO CLOG OR JAM
CAPACITIES UP TO 125,000 GPH
GAS OR ELECTRIC

Streamlined where it counts, you can't clog a Gorman-Rupp Self-Priming Pump. Unequalled in rugged efficiency, gallonage or continuous hours. A size and type for every need.

THE GORMAN-RUPP COMPANY, MANSFIELD, O

GORMAN-RUPP
SELF-PRIMING CENTRIFUGAL PUMPS

QUICK REPAIRS RIGHT ON THE JOB

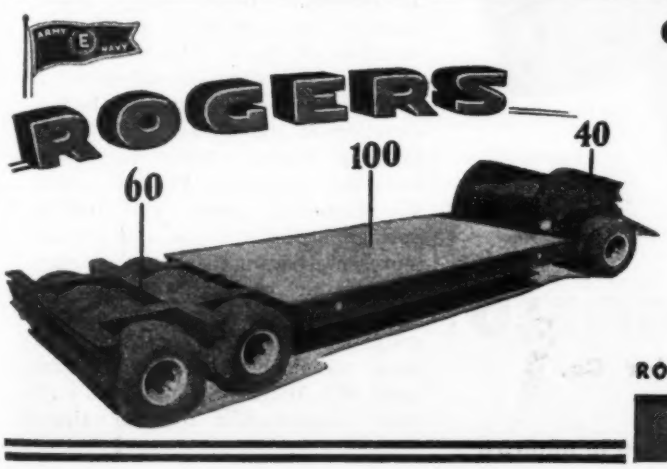
Don't let breakdowns mean long lay ups! Repair-weld your equipment on the job. Do it in a few hours—save days required to obtain replacement parts.

You can prolong the life of your equipment indefinitely—by building up and hard-surfacing with P&H Welding Electrodes. P&H welding engineers will be glad to help you as to the type to use and procedure to follow. The complete P&H line of welding electrodes includes a size and type for every requirement—for repair-welding; or for building up and hard-surfacing to provide unusual resistance to wear, impact and abrasion.

TODAY call your nearest P&H representative—he's ready to help you. Or if you wish, write us for complete-line booklet.

General Offices: 4496 W. National Ave., Milwaukee 14, Wis.

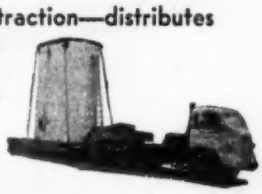
HARNISCHFEGER
CORPORATION
WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS



Contribute to Unusual Performance

ROGERS TRAILERS are so designed as to carry 60% of the load on the rear unit and 40% on the tractor.

This provides the necessary traction—distributes the load properly over all tires—and greatly improves the haulability and brakeability of both tractor and trailer.



ROGERS BROTHERS CORP. ALBION, PENNA.

EXPERIENCE builds 'em ROGERS HEAVY DUTY PERFORMANCE tells 'em

New Canadian Distributor for Teco

The Timber Engineering Co., Washington, D. C., has announced the transfer of Canadian distribution rights of Teco timber connectors and other products from V. H. McIntyre, Ltd., to J. E. Goodman, well-known Toronto engineer. Goodman, who launched his new company in August, will continue the complete timber engineering, lumber information, and sales services established by the McIntyre company under the late Verne H. McIntyre.

Indiana Equipment Co., Inc., Appointed Bucyrus-Erie Distributor

Indiana Equipment Co., Inc., 327 West Market St., Indianapolis, Ind., has been appointed distributor in central and northeastern Indiana for Bucyrus-Erie ⅜ to 2½-yard shovels, draglines, cranes. With the exception of Lake, Porter, and LaPorte counties in the northwest, their territory includes all of Indiana north of (but not including) the counties of Knox, Daviess, Martin, Lawrence, Jackson, Jennings, Ripley, Dearborn.

W. N. Fischer Promoted by LeTourneau

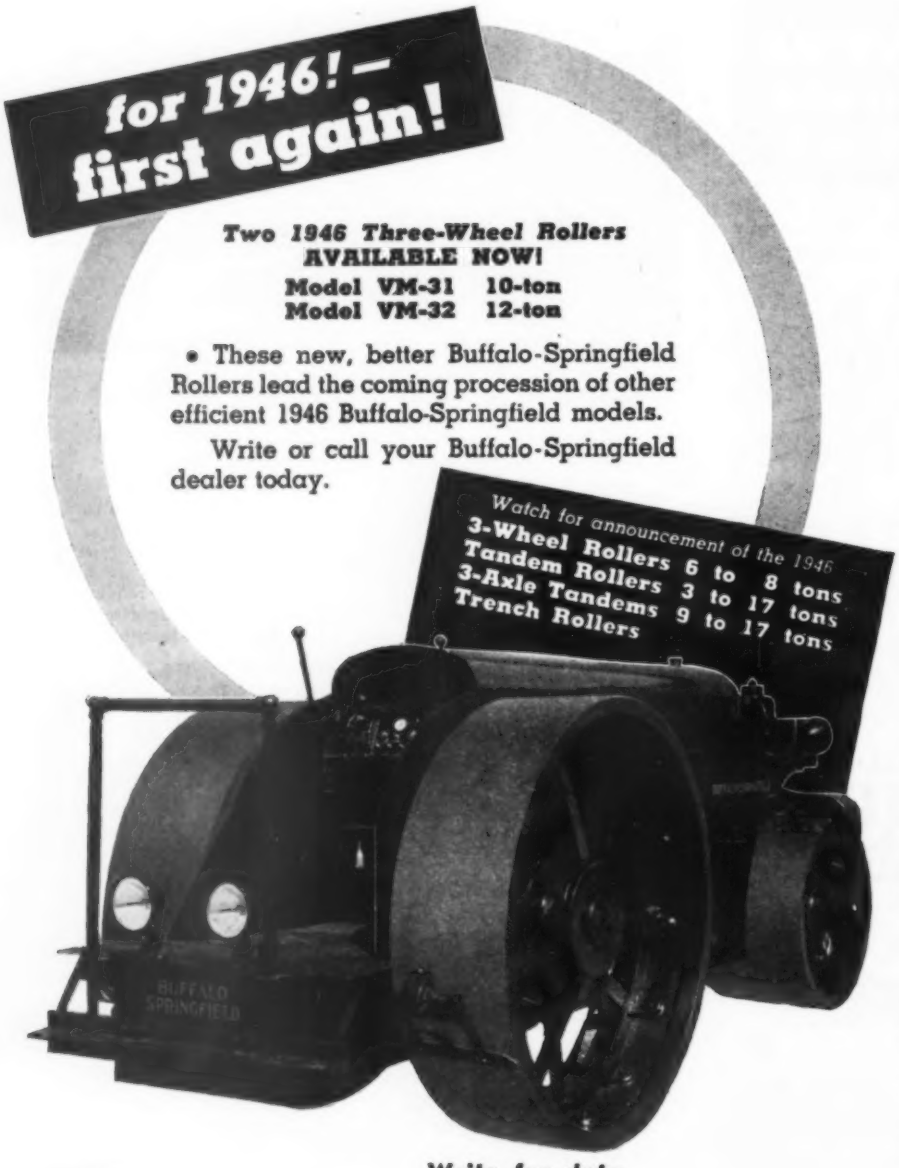
W. N. Fischer

Walter N. Fischer has been appointed assistant to the general sales manager of R. G. Le Tourneau, Inc., Peoria, Ill. Mr. Fischer's promotion will entail assisting Gordon S. McKenty, general sales manager, in general office administration, as well as working closely with divisional sales managers in the co-ordination of the exclusive LeTourneau Distributor sales organization. Mr. Fischer joined R. G. LeTourneau, Inc., four years ago as manager of its newly created war contracts division. Mr. Fischer for three years was Chicago district manager for Schramm, Inc. He had been previously affiliated with them for 12 years at their home office in West Chester, Pa., and with their West Coast distributors.

Buffalo-Springfield V.P. Named General Sales Manager

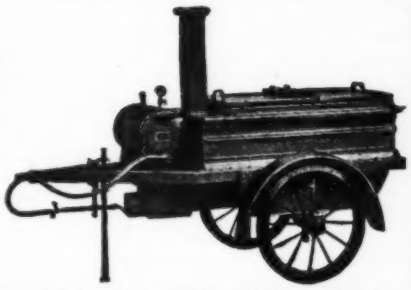
W. J. Hazeltine

W. J. Hazeltine, heretofore vice-president in charge of distribution, has been named general sales manager of the Buffalo-Springfield Roller Co., Springfield, O. He has been in the civil engineering and construction field since 1913. Following his graduation from the civil engineering department of Ohio Northern, he was city engineer of Mansfield, Ohio, from 1913 to 1917. Prior to his enlistment in the service of World War I, he assisted in the supervision of the construction of Camp Meade and immediately following his enlistment in the Navy he was assigned to the construction of the Great Lakes Naval Training Station. After his release from the service in February, 1922, Mr. Hazeltine joined the Buffalo-Springfield Roller Co. as a direct sales representative for the company, starting with the northern Ohio territory and later extending this area over the entire country. More recently, he has been responsible for the establishment of a Buffalo-Springfield distributor's organization for the United States.

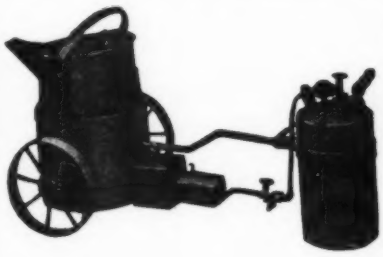

for 1946!—
first again!
Two 1946 Three-Wheel Rollers
AVAILABLE NOW!
Model VM-31 10-ton
Model VM-32 12-ton
• These new, better Buffalo-Springfield Rollers lead the coming procession of other efficient 1946 Buffalo-Springfield models.
Write or call your Buffalo-Springfield dealer today.
Watch for announcement of the 1946
3-Wheel Rollers 6 to 8 tons
Tandem Rollers 3 to 17 tons
3-Axle Tandems 9 to 17 tons
Trench Rollers
BUFFALO SPRINGFIELD
Write for data
BUFFALO-SPRINGFIELD
The Buffalo-Springfield Roller Co.
Springfield, Ohio
The Oldest and Largest Builder of Road Rolling Equipment in America

CONNERY'S HEATING KETTLE

For speedy heating of tar and asphalt—



Use this CONNERY oil-burning Patrol Patching Heater on the *small* job and this CONNERY oil-burning kettle for *large-quantity* production.



Write for catalog showing our full line of tar and asphalt heating kettles, spraying attachments, pouring pots, etc.

CONNERY CONSTRUCTION Co.
3900 North Second St. Philadelphia, Pa.

IN THE HEART OF DOWNTOWN

MILWAUKEE

450 ROOMS *of* COMFORT

...Friendly hospitality. Coffee Shop, Cocktail lounge, Garage and parking lot. Remember—Milwaukee's BEST BUY!

with bath - from $2.75

without bath-from $1.65

Owner Operated by
The Milwaukee Hotel
Wisconsin Co.
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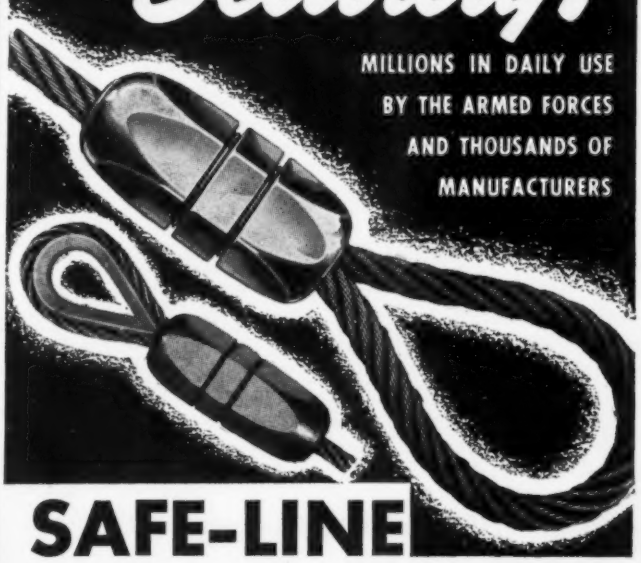
A BETTER METHOD OF HOLDING WIRE ROPE *Securely!*

MILLIONS IN DAILY USE BY THE ARMED FORCES AND THOUSANDS OF MANUFACTURERS



SAFE-LINE WIRE ROPE CLAMP

Eliminates Splicing and Serving
Much faster—saves time—reduces cost. Minimizes rope or sling breakage. Holds tight thimble.

Easy to Use, Easy to Re-adjust
No highly skilled labor or special tools required. Easy to adjust as rigging stretches.

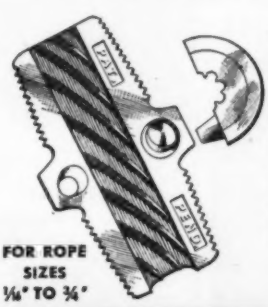
Outpulls Strongest Rope—Never Slips
¾" 6 x 19 Improved Plow Steel Wire Rope broke at 46,850 pounds on Riehle Testing Machine. SAFE-LINE Clamp *held.*

Economical—Use Again and Again
Thousands of the first SAFE-LINE Wire Rope Clamps made are still in use. Low initial cost.

Safe—Prevents Personal Injury, Mental Hazards
Exposed needle-sharp wire ends safely enclosed inside of clamp protects against cutting or scratching hands and arms. Smooth rounded shape prevents catching clothing or fouling.

Replacement Guarantee
Every SAFE-LINE Wire Rope Clamp carries a replacement guarantee against breakage and fracture.

APPROVED BY UNDERWRITERS LABORATORIES
APPROVED BY CIVIL AERONAUTICS ADMINISTRATION



FOR ROPE SIZES ⅛" TO ¾"

Never Slips

FORGED AND MASTER COINED TO FIT ROPE

Double spiral splines fit each wire and strand, provide a perfect, secure GRIP on rope. Pressure equally distributed over large area eliminates cutting action. Locking lugs automatically line-up threads.

WRITE FOR DESCRIPTIVE PRICE LIST FOLDER

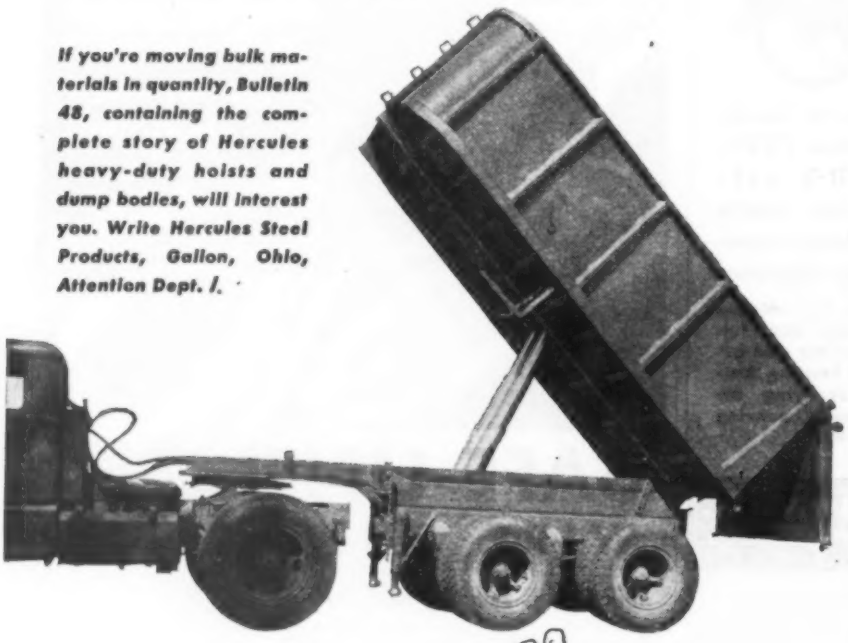
NATIONAL PRODUCTION COMPANY
4571 ST. JEAN AVENUE • DETROIT 13, MICHIGAN

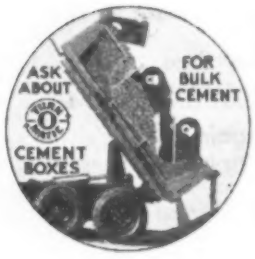
RAILROAD WITHOUT RAILS!

Just two trips with one of these 22-ton Hercules trailer dump bodies and you've moved a full railroad carload of limestone, gravel, coal, crushed stone or any other bulk material. These designed-for-duty, built-for-business dump bodies carry 17 yards in every load—that's moving material the BIG way!

And it's the economical way, too, for one 22-ton load, moved quickly and easily in a Hercules trailer unit, eliminates numerous trips with dump trucks of lesser capacity, cuts time, labor and operating costs to the minimum. This extra capacity also makes it practical to move materials longer distances by truck, avoiding additional handlings required with combined truck-rail hauling.

If you're moving bulk materials in quantity, Bulletin 48, containing the complete story of Hercules heavy-duty hoists and dump bodies, will interest you. Write Hercules Steel Products, Galion, Ohio, Attention Dept. I.





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SPLIT SHAFT POWER TAKE-OFFS • COAL CONVEYORS

Ask About Turn-O-Matic Cement Boxes for Bulk Cement—Now Available—Write Today

HERCULES STEEL PRODUCTS COMPANY . . . GALION, OHIO

PORTABLE ASPHALT PLANTS
High Production—Low Cost

THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

SAVE 50%
• on Fuel
• on Time

Aeroil Heet-Master
HEATS AND MELTS ASPHALT
TWICE AS FAST

The ONLY insulated tube fired kettle with a completely removable heating unit (for quick and easy cleaning). The ONLY kettle with the burner INSIDE. Now available on pneumatics (and with mud guards too at slight extra cost. Send for FREE Bulletin No. 200HR. For paving tools and accessories write for Leaflet No. 501RS.

AEROIL PRODUCTS COMPANY
WEST NEW YORK, N. J.
Chicago San Francisco Dallas

O'Neall Division Moves

Armco Drainage & Metal Products, Inc., recently moved the headquarters for its O'Neall Division from Chicago to South Bend, Ind. This company is a wholly owned subsidiary of The American Rolling Mill Co., Middletown, O., and the O'Neall Division operates in the states of Indiana, Illinois and lower Michigan. Ken C. Thomas, manager of the division, has moved his family from Chicago to South Bend. Russell G. Betts, railway representative, and C. D. Beerup, sales engineer, will, however, remain in Chicago at 310 South Michigan Ave.

Richkraft Opens Western Office

C. A. Cook

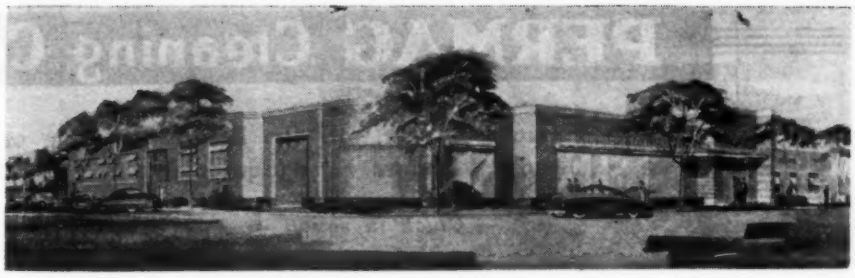
The Richkraft Co. opened a west coast office on Sept. 15. It is located in the Pacific Bldg., Oakland, Calif., and is under the management of C. A. Cook. Mr. Cook came out of the Civil Engineering School, University of Illinois, in 1932. He joined the Sisalkraft Co. in 1933 and was the San Francisco salesman for this company from 1939 until 1943. His experience in those 10 years covered every phase of merchandising, sales and service of building papers. His activities were first in the Middle West, then on the East Coast, and finally centered in California in 1939. Since 1943, Mr. Cook was district engineer for the H. H. Robertson office in San Francisco.

Four New Distributors for Lima

Lima Locomotive Works, Inc., Lima, O., has announced the appointments of four new distributors for Lima shovels, draglines and cranes: Construction Equipment Corp., 11-22 43rd Ave., Long Island City, N. Y. Territory: Southeastern New York, Long Island, Staten Island. Bill Goodwin Machinery Co., P. O. Box 2687, San Antonio, Tex. Territory: Extreme southern Texas. Reid-Holcomb Co., 370 S. Illinois St., Indianapolis, Ind. Territory: All of Indiana except a few counties in southeastern and northwestern Indiana. Southern Iron & Equipment Co., P. O. Box 2029, Atlanta, Ga.. Territory: Northwestern Georgia.

Patten Erecting $300,000 Plant

Construction is underway on the new Chicago plant of Patten Tractor & Equipment Co., exclusive distributors for the products of Caterpillar Tractor Co., in northern Illinois and northwestern. Scheduled for completion by next March, the new plant will cost more than $300,000. It is located on a 150,000 sq. ft. site in Bellwood, a Chicago suburb. Plans call for erection of a main building covering 38,000 sq. ft. as well as two auxiliary buildings for storage and special services which will consist of an additional 10,000 sq. ft. Facilities will include a 100-ft. display room; a theatre which will seat 100 persons and will have complete sound projection equipment; a fully equipped 12,000-sq. ft. service department, and a 10,000-sq. ft. parts department.



Sketch of New Plant for Pattern Tractor & Equipment Co. at Bellwood

24 HOUR SERVICE

The "top" men at Insley know what it costs in dollars and cents for "down-time" due to lack of parts because they once "sat in the cab" themselves.

That's why these men who build Insley Excavators now make this pledge to every owner of an Insley Excavator: that at least 96% of all replacement parts orders for Insley equipment will be shipped the same day as received.

Yes, these men know the true meaning of prompt service . . . and they also know what it takes for *low-cost yardage*. "What it takes" you'll find in Insley Excavators.

With wartime manufacturing facilities now devoted entirely to civilian production, you are assured of early delivery on a new Insley Excavator. Two sizes, 3/8 and 1/2-yd. . . . five interchangeable attachments . . . rubber, crawler or rail-mounted . . . gasoline, diesel or electric-powered.

INSLEY MANUFACTURING CORP., INDIANAPOLIS 6, IND.

School for Distributor Sales and Servicemen

The Galion Iron Works & Mfg. Co., of Galion, O., one of the leading manufacturers of road graders and rollers, has organized a course at its factory where distributor sales and servicemen can obtain complete instructions in the servicing of Galion equipment, enabling them to provide expert factory service in the field. The course, which covers one week of intensive training, is being given to distributor sales and servicemen in small groups to insure individual instruction. It has been having a wide acceptance among the many Galion distributors located throughout the United States.

A. J. Bartlett Made Industrial Engine Sales Manager for Le Roi

A. J. Bartlett

According to a recent announcement by John Dolan, General Sales Manager, Le Roi Company, Milwaukee, Wis., A. J. Bartlett is now responsible for the sale of industrial engines to original equipment manufacturers. Mr. Bartlett, who majored in mechanical engineering at the University of Wisconsin, has been with Le Roi Co. since 1935 and brings a wealth of experience to this new department. Starting as a draftsman 10 years ago, he progressed through the Experimental Department, where he engineered fuel economy tests on engines and air compressors, and the Sales Department which he joined in 1938 as a sales engineer. There his work consisted of organizing the Product Order Department and handling engineering and engine application sales.

PERMAG Cleaning Compounds

Removes grease, oil, dirt before repairing or reconditioning Trucks, Tractors, Road Equipment.

— Quick in action
— Efficient
— Economical

(Use PERMAC COMPOUNDS for cleaning Garage Floors, and Pits too.)
Details on Request.

Nationally Represented. Warehouses in principal cities.

MAGNUSON PRODUCTS CORPORATION

Main Office: 50 Court St. BROOKLYN 2, N. Y.
In Canada: Canadian Permag Products, Ltd., Montreal, Toronto.

½ Cu. Yd. — 8' Lift

FRONT END LOADERS for Industrial Tractors
Write for Catalog

Elkhart **White Mfg. Co.** Indiana

IMMEDIATE DELIVERY
6" BLACK LIGHT WT.

STEEL

PIPE

Plain end for welding and grooved for Victaulic coupling.
★ 750,000 ft. 6" I.D.-6¼" O.D.-⅜" Wall
Test 900 lb.—Pressure 650 lb.
Weight—approximately 8 lbs. per ft.
35c per ft., carload lots,
F.O.B. New Orleans, Louisiana

Dealers Inquiries Solicited.
For further information, write or call

GORDON IRON & SUPPLY CO.

Phone Wayside 2305 — 7152 Navigation Blvd.
HOUSTON, TEXAS

Forty Years' Industrial Experience Available

Purchasing—raw materials finished materials, component apparatus, accessories, and supplies essential in the manufacture of heavy or light industrial machinery or agricultural equipment and domestic appliance.
Experience covers all types of castings, forgings stampings, screw machine parts, all classes of steel and alloy bars, sheets and shapes. Also materials of all clases for manufacture of mechanical and electrical products. Also machine tools, metal working machines, material handling equipment and industrial plant apparatus.
Materials purchased in past were for manufacture of mining and quarry machinery, electric locomotives, internal combustion engines, electric motors, centrifugal and piston pumps, all types of scales, railroad motor and hand cars, engineering instruments, steam specialties, automotive and hardware specialties, etc. Knowledge covers wide range of industrial plant and contractors equipment—and materials and their sources of supply.

Box 1810, Roads & Streets
330 So. Wells Street, Chicago 6, Illinois

MODERN ASPHALT PLANTS

1½ Ton Cummer Tower Plant, Oil Fired. Complete with Tanks.
2 Ton Warren Tower Plant.

TRACTOR CRANE

2 Ton Cap. Hughes-Keenan 8 Ft. Boom Roustabout Tractor Crane.

TANKS

8,000 — 10,000 — 20,000 Gal.

Extra Heavy Construction with or without Heating Coils—Shipment from La.—Ill.—N. J.—Va. and Texas.

L. M. STANHOPE

ROSEMONT — PENNA.

FOR SALE

Sand Dust Plant. Includes hoppers, conveyors, drying oven and grinding mill. Capable of producing one ton sand dust per hour. Write or phone

Atlantic Brick & Tile Co.
441 Stuart Street
Boston, Massachusetts
Telephone—Commonwealth 6854

FOR SALE

P. & H. 150, latest model, combination shovel-dragline, ½ cu. yd. A1, 55% ceiling.
Bay City, model XR, new 1936, rebuilt, new crawlers, engine,—upper deck first-class, —40 ft. boom, 1 cu. yd. Dragline bucket, also 20 ft. extension. Long crawlers. $5500.00. Also shovel attachment, if desired.
Allis-Chalmer HD-7W with Baker Dozer. 1942. Guaranteed, first-class. $3750.00.
Allis-Chalmer HD-10W. with Garwood Dozer and 2-drum Hoist for scraper use. Like new. 70%.
Le-Roi, 315 cu. ft. 2-stage Portable Compressor. Overhauled, guaranteed. $1750.00.
Ingersoll-Rand, late model X-71 Wagon drill, with D-2 mounting for 10 ft. changes. Guaranteed. $750.00.
Brooks—Load Lugger, late model CH-200, with 2 cu. yd. buckets. $600.00.
Iowa Portable Crushing plant, 12"x20" r.b. 24 ft. folding type elevator, 60 H.P. Engine. $2500.
Telsmith R.B. 15"x38" rebuilt Crusher. $3500.00.
Diamond complete portable, 20"x36" Crushing plant, rolls, conveyors, screens, bin and 2—13,000 Cat. engines.
International I-9, Duals, with Hough Front end Loader. Like new. $2875.00.
M. Wenzel, 2136 Jefferson, Kansas City, Mo.

WANTED

Experienced concrete pipe plant manager, familiar with Universal Machine. Also machine operator (Universal).

Eastern Concrete Pipe Corp.
98 Lyon Street, New Haven, Conn.
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STRUCTURAL DRAFTSMEN AND DESIGNERS

Structural steel and reinforced concrete in connection with the design of highway structures. Immediate and permanent employment. Salary open. Submit experience and educational record together with minimum acceptable salary with letter of application.

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S. DAK HIGHWAY COMMISSION
PIERRE, SOUTH DAKOTA

TIRE REPAIRS

All sizes truck, tractor and 1800x24 tires. Our Equa-Flex repair is built for heavy and rough work.

Farm tractor and passenger tires are guaranteed for the life of the tread.

WALLACE TIRE SERVICE, Inc.
2329 S. Michigan Ave. — Chicago 16, Ill.

Manufacturers' Literature

Heavy Duty Lubrication

The story of Amalie H-D, a detergent-type, anti-oxidant, heavy duty motor oil is told in a booklet released by the Amalie Division of L. Sonneborn Sons, Inc., New York. It describes how costly repairs and layups due to faulty lubrication may be avoided and offers constructive suggestions. The booklet features a "trouble-shooting" section which shows how moving metal parts, including pistons, sleeves, rings and bearings, can be conserved and given extra protection for the toughest kind of service. Sub-zero lubrication practices are also discussed.

▼

Self-Priming Centrifugal Pump

The La Bour Type G pump, which has no packing nor mechanical seal, is illustrated and described in a bulletin issued by the La Bour Co. Inc., Elkhart, Ind. How effective seal is provided without packing or close clearances and how the pump primes itself by the La Bour hydrobalance system is described in the bulletin. Information also is given on the installation and proper operation of self-priming centrifugal pumps.

▼

Rock Drill Accessories

Accessories for rock drills and air tools are illustrated and described in a bulletin issued by Worthington Pump and Machinery Corporation, Holyoke, Mass. The items include pavement breaker, clay and trench digger tools, air and water hose and fittings, air line manifolds, detachable bits columns for drifting drills, etc. Price list for all the accessories is included.

▼

Flexible Pipe Couplings

A new line of pipe couplings of interest to contractors and engineers is described in a bulletin of Drinkwater, Inc., Chicago, Ill. The couplings are of the wedge type, with three simple parts chained together to prevent loss of parts. The bulletin points to the many applications for the Presto-Lock couplings, illustrating the simplicity of coupling parts and gives complete engineering data, drawings and specifications on the 11 sizes from 1¼ in. to 16 in.

"A RUGGED INDIVIDUALIST"

MARION STANDARD DUMP

That's what they say of the Marion "Standard Dump".

This standard heavy-duty body and hoist has been designed by Marion traveling engineers. These men get their facts from studies of actual work conditions right in the field. That is why the name MARION means "Built to Take It."

See Marion for complete line of standard or custom-built equipment. There's a Marion Body and Hoist for every hauling job.

See Your Local Distributor or Write
THE
MARION METAL PRODUCTS CO.
BODY and HOIST DIVISION, MARION, O.

VULCAN

VULCAN PAVEMENT AND CLAY DIGGING TOOLS

ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan illustrated CATALOG today.

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QUINCY, MASS

RELIANCE

CRUSHING, SCREENING and WASHING UNITS

● Up to 2000 Tons a Day ●

Crushers, Elevators, Sweepers, Screens, Wash Boxes, Bins, Pulverizers, Feeders, Spreaders, Kettles, Conveyors, Drag-Lines "GAYCO", Centrifugal Air Separators

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.

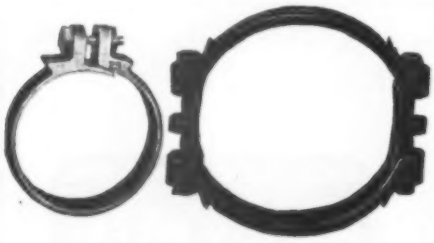
Canadian Representatives: F. H. Hopkins & Co., Ltd. 340 Canada Cement Co., Montreal, Que., Can.

Every DIXON Product Has its Special Features

Distinctive characteristics of design and construction in DIXON couplings, nipples, menders and clamps assure important service advantages on every type of hose. The products described below are typical.

"KING" COMBINATION NIPPLE

Made from malleable iron or brass and widely used in place of regular iron pipe nipples. Designed to fit straight end hose (without enlarged ends), and can be readily reset when necessary. Patended "Cor-O-Zig" Corrugations have two advantages—easier to insert in hose, because of spiral corrugations on end portion; and greater holding power under clamp pressure by reason of zig-zag corrugations on other half of shank. The latter also prevent nipple from turning in hose.



"KING" HOSE CLAMPS

Single Bolt Double Bolt

The strongest clamps of their kind, and easiest to attach. Perfect conformance to hose perimeter, with broad bearing surface, insures equally distributed compression when clamps are tightened, without cutting into hose cover and carcass. Double bolt style has quadruple take-up, providing exceptional gripping power. Bolt lugs are heavily reinforced, while tongue, and ears for vice jaws, are full width. Sizes: Single Bolt, for hose ⅞" to 5¼" O.D.; Double Bolt, 3½" to 17¼" O.D.

Sold by Manufacturers and Jobbers of Mechanical Rubber Goods.

DIXON
VALVE & COUPLING CO
Main Office and Factory: PHILADELPHIA, PA
BRANCHES: CHICAGO-BIRMINGHAM-LOS ANGELES-BOSTON

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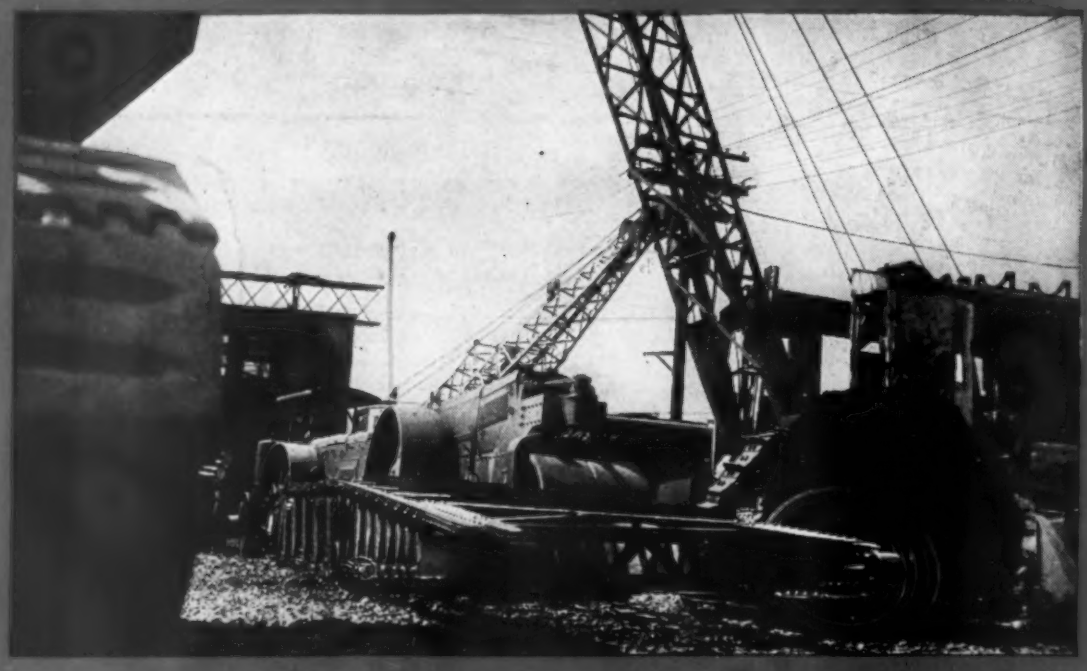

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